Livr. XXXVIII.

RÉSULTATS DES EXPLORATIONS
ZOOLOGIQUES, BOTANIQUES, OCÉANOGRAPHIQUES ET GÉOLOGIQUES
ENTREPRISES AUX
INDES NÉERLANDAISES ORIENTALES en 1899—1900,
à bord du SIBOGA
SOUS LE COMMANDEMENT DE
G. F. TYDEMAN
PUBLIÉS PAR
MAX WEBER
Chef de l'expédition.

Siboga-Expeditie

THE

SIPHONOPHORA OF THE SIBOGA EXPEDITION

BY

ALBERTINE D. LENS and THEA VAN RIEMSDIJK
Utrecht.

With 24 plates and 52 textfigures

Monographie IX of:

UITKOMSTEN OP ZOOLOGISCH, BOTANISCH, OCEANOGRAPHISCH EN GEOLOGISCH GEBIED

verzameld in Nederlandsch Oost-Indië 1899—1900

aan boord H. M. Siboga onder commando van
Luitenant ter zee 1e kl. G. F. TYDEMAN

UITGEGEVEN DOOR

Dr. MAX WEBER
Prof. in Amsterdam, Leider der Expeditie

(met medewerking van de Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën)

BOEKHANDEL EN DRUKKERIJ
VOORHEEN
E. J. BRILL
LEIDEN

Publié Mai 1908

* Les numéros avec un astérique ont déjà paru; ceux marqués 1) seulement en partie

Voor de uitgave van de resultaten der Siboga-Expeditie hebben bijdragen beschikbaar gesteld:

De Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën.

Het Ministerie van Koloniën.

Het Ministerie van Binnenlandsche Zaken.

Het Koninklijk Zoologisch Genootschap »Natura Artis Magistra" te Amsterdam.

De »Oostersche Handel en Reederij" te Amsterdam.

De Heer B. H DE WAAL Oud-Consul-Generaal der Nederlanden te Kaapstad.

M. B. te Amsterdam.

SIBOGA-EXPEDITIE.

Siboga-Expeditie

UITKOMSTEN

OP

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IX

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PUBLISHERS AND PRINTERS
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PREFACE.

The enormous difficulties which accompany any attempt at systematic definition and description of preserved specimens of the very delicate *Siphonophora* have been forcibly insisted upon by CHUN in the preface to his work on the Siphonophores of the Plankton expedition (1897). These difficulties are increased by the fact that the different forms and species are as yet in so many respects still very imperfectly known and have often been insufficiently described.

Moreover the literature of the subject is already very extensive (120 different titles are cited in our list) and many articles are neither lucid nor exhaustive. Papers that have been written by authors who have examined living specimens are often very difficult to interpret for those wo find themselves restricted to observations on preserved material.

We have attempted to become acquainted with the specimens of former expeditions as far as they are yet to be found in the different Museums. Of the Challenger *Siphonophora* the British Museum contains no further remnants than a certain number of specimens of *Rhodalia miranda* Hkl. Of all the other species described in HAECKEL's bulky volume — also of his own private collection — no traces are left.

We were informed by the Curator, Mr. R. KIRKPATRICK, that Prof. HAECKEL had written to him, that a great number had been submitted to anatomical investigation and that the rest had been in an unsatisfactory state of preservation. This may explain their present deficiency.

We have also examined specimens that are contained in the Musée d'Histoire Naturelle in Paris, in the Berlin Museum, in the Museum at Leipzig University and in the Museum of Comparative Zoology at Cambridge, Mass. and in the aquaria of the Zoological Station at Naples.

We wish to thank Sir Edwin Ray Lankester, Profs. E. Perrier, F. E. Schulze, C. Chun, A. Agassiz and Ant. Dohrn for their valued permission to carry out such examination and Messrs. Kirkpatrick, Joubin, Eisig, Mayer and Lo Bianco for their personal assistance.

All this has made us very diffident whenever the question of instituting new species or genera arose. Among the Physonecta we have distinguished four groups which may possibly contain a certain number of new species, sufficiently distinct the one from the other, but which we refrain from introducing into science under separate specific names so long as they have not been examined in the living state. We have not adopted the same plan for all the 4000 specimens of which the Siboga collection consists, although we must admit that about 600 of these are too damaged or too insufficiently preserved to allow of even an attempt at specific determination, many *Calycophorids* being moreover represented only by loose special nectophores, bracts, gonocalyces or inferior nectophores. In some cases we must recognize that our descriptions can be no more than provisional.

On the other hand we feel justified in looking upon our new genera *Clausophyes*, *Chuniphyes*, *Diphyabyla* and *Archangelopsis* as more definitely established and have no doubt that it will not be difficult to recognize them among the harvest that future expeditions may garner.

Besides these genera we have described 18 new species, some of which — more especially the eleven new *Calycophorids* — are very much in want of confirmatory observations.

One new subfamily has presented itself to us (*Diphyabylinae*); to one family (*Bathyphysidae*) we have secured its definite right of existence in the system. Finally we feel justified in proposing the total suppression of the order of *Auronectae* (Haeckel) and the arrangement of the genera belonging to it in the family of the *Angelidae*, which was introduced by Fewkes in 1884. This is undoubtedly of some importance also from a more general point of view.

Finally we wish to express our thanks to Prof. Hubrecht for the hospitality afforded to us in his laboratory during the four years that we have been occupied with this collection and for his kind help and advice on so many occasions.

As to Prof. Weber, we hope that he will not regret having entrusted the working up of the *Siphonophora* of his eminently fruitful expedition to our inexperienced hands. The responsibility he has laid upon us has been a constant stimulus, the confidence shown to us an invaluable source of energy for the completion of an arduous but inspiring task.

CHAPTER I.

I. Ordo CALYCOPHORA Lkt. 54.

Fam. Monophyidae Cls. 74.

Subfam. Cymbonectinae Hkl. 88.

Doramasia Ch.

1. *Doramasia pictoides* nov. spec. Pl. I, fig. 1.

Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 A (I) formald. 4°/₀. One specimen.

Chun (**92**) has given a very clear and accurate description of a *Monophyid* (found by him n '**88** close to the Canary Islands) having the shape of a true *Diphyid* but differing from the whole family of *Diphyidae* by the total absence of any second nectophore, and has called it *Doramasia picta*. During several consecutive days he observed about forty live specimens. None of these ever developed a second nectophore, nor was there the slightest indication of the growth of a bud, which might have developed into one (**92** page 95).

As we only had preserved material it is ever so much more difficult to come to any positive conclusion about the presence or absence of a nectophore-bud in our *Doramasia pictoides*.

It is however very remarkable that among the thousand and more (all *Diphyid*-like) superior nectophores collected by the Siboga expedition there is only one, and a very tiny one, which shows so clearly the naked stem devoid of any other appendages but a terminal group consisting of a siphon, a tentacle and a bud sitting closely together (Pl. I, fig. 1). This bud cannot be a future second nectophore as it is situated too far from the implantation of stem and somatocyst and much closer to the siphon. Moreover the siphon is probably quite mature and the development of the bud could not but have followed very soon.

As Chun calls the *Diphyid*-like *Monophyidae Doramasia*, there is no reason why we should not use the same generic name. The specific details differ however too much — always taken as granted that our specimen is a true *Monophyid* — to allow us to use the name "*picta*". We therefore wish to call our *Doramasia* "*pictoides*" thereby indicating the relation which exists between these two probably closely allied *Monophyids*. But if later explorations bring to light

that *Doramasia pictoides* is a *Diphyid*, we should place it near to our new species *Diphyes (Diphyopsis) Gegenbauri* (see page 46).

Nectophore. Length ± $5^1/_2$ mm.

The nectophore is of a pyramidal shape and is five-edged, the ridges meeting very closely in the apex. In this respect the species *Doramasia picta* of CHUN (**92**) shows the same structure. Each ridge is elegantly serrated, yet more so at the top and at the base of the nectophore and goes straight downwards without any winglike enlargement in the upper third part of the nectophore. The dorsal and antero-lateral ridges end each in a slightly inflexed point.

CHUN (**92**) tells us how the point of the dorsal ridge in his specimen is one third longer than the antero-lateral ones.

In *Doramasia pictoides* the three points are of equal length. (Pl. I, fig. 1).

The difference in length between the right antero-ventral and postero-ventral points and the left antero-ventral and postero-ventral ones is clearly marked. In *Doramasia picta* the antero-ventral differ only slightly from each other, while the postero-ventral are of equal length according to CHUN's figure (**92** Plate IX, fig. 9).

The inferior ridges connecting these anterior and posterior ventral points are decidedly concave; the same is the case in CHUN's specimen.

The whole inferior part of the nectophore is beautifully regularly serrated, the same as in *D. picta*.

Nectosac.

The nectosac is a cylindrical tube, widening itself very gradually towards the distal point of the nectophore. There is no question of a sudden narrowing of the nectosac as CHUN finds in his *Monophyid*. He says that this caecal extremity of the nectosac is a characteristic of the genus (**92** page 93) but we shall describe further on how much variety there exists in the more or less narrowing of the nectosacs in *Diphyids*. And there is no reason why these transitions should not occur in *Monophyids* quite as well. At any rate we do not find it characteristic enough to make a new genus only on this account.

Canals of the nectosac.

The canals of the nectosac are not well preserved enough to give any clear description. In fact the entire wall of the nectosac has undergone much alteration by the preservative fluid. This is probably the reason why we could not find any "Gefässplatte" at the ventral wall, as CHUN describes in *D. picta*. (**92** page 93).

Hydroecium.

The hydroecium is situated in the third lower part of the nectophore; it is campanulate and its aperture is quadrilateral, the ridges being slightly concave as is said above. CHUN's figure 3 of plate VIII (**92**) shows us the somewhat higher implantation of the somatocyst.

Somatocyst.

The somatocyst is narrow and subcylindrical, it accompanies the nectosac and ends somewhat below the apex of the latter.

Stem.

The stem is very short. Immediately below the somatocyst there is no bud. Its only

appendages consist of a mature or nearly mature siphon and tentacle (both tentacle and tentilla being very indistinctly preserved) and a bud, (Pl. I, fig. 1 *brgon*) the probably future gonophore and bract.

This primary group of appendages has therefore arrived at the stage which Chun (**92**) calls "zweites Stadium" (pag. 98). This very tiny little *Monophyid* is, as is said above, not well preserved enough to make out definitely whether it is really a specimen belonging to this sub-family or not.

As soon as other *Diphyid*-like *Monophyids* will be found, perhaps it will be possible to give a definite place in the system to the Siboga specimen which we called provisionally *Doramasia pictoides*.

Through carelessness the only specimen of *Doramasia pictoides* was unfortunately destroyed; happily text and sketches were ready when this occurred.

Ersaea Ch.

2. *Ersaea Bojani* Eschsch. 25.

= *Eudoxia Bojani* Eschsch. 25.
= *Eudoxia Bojani* Huxl. 59.
= *Ersaea Bojani* Chun 88.
= *Ersaea picta* Chun 92.

Stat. 50. Bay of Badjo. West coast of Flores. *Cat.* 166 C. H. formald. 4°/₀. One specimen.
Stat. 66. Bank between islands of Bahuluwang and Tambolungan South of Saleyer. *Cat.* 140 E. alc. 90°/₀. 2 specimens.
Stat. 121. Menado-anchorage. *Cat.* 39 B. formald. 4°/₀. One specimen.
Stat. 136. Ternate-anchorage. *Cat.* 80 F. formald. 4°/₀. 4 specimens.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 D. formald. 4°/₀. One complete, 2 incomplete specimens.
Stat. 144. Anchorage North of Salomakiëe (Damar-)island. *Cat.* 122 B. formald. 4°/₀. 5 complete, one incomplete specimen.
Stat. 165. Anchorage on North east side of Daram-island. (False Pisangs) East coast of Misool. *Cat.* 164 M. formald. 4°/₀. One complete, one incomplete specimen.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 A. formald. 4°/₀. One specimen.
Stat. 169. Anchorage of Atjatuning, West coast of New-Guinea. *Cat.* 55 A. formald. 4°/₀. 4 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 E. formald. 4°/₀. 19 complete, 2 incomplete specimens.
Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46 E. *Cat.* 65 D.H. formald. 4°/₀. One complete, one incomplete specimen.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.D. formald. 4°/₀. One specimen.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 126 A. alc. 90°/₀. 17 specimens.
Stat. 220. Anchorage off Pasir Pandjang, West coast of Binongka. *Cat.* 144 A. alc. 90°/₀. 8 spec.
Stat. 223. Lat. 5° 44′.7 S., Long. 126° 27′.3 E. *Cat.* 31 A. alc. 90°/₀. One specimen.

The description of Eschscholtz and his figures of this *Ersaea (Eudoxia) Bojani* in **25** and **29** are clear enough for the general aspect of this species, but details are not mentioned. Huxley (**59**) gives a very short description of one specimen caught on the South coast of New Guinea and refers to Eschscholtz. Plate III, fig. 7 and 7*a* of his work are of much value for further investigators.

CHUN (**88**) only just mentions the appearance of *Ersaea (Eudoxia) Bojani* in the material of the Canary Islands. He has therefore acknowledged the similarity with HUXLEY's and ESCHSCHOLTZ' pacific specimens, by using the same specific denomination.

In **92** he first proposes (page 99) "die Benennung *Ersaea (Eudoxia) Bojani* der pacifischen "Eudoxiengruppe zu belassen und die atlantische Gruppe als *Ersaea picta* zu bezeichnen". Furtheron he tries to show specific differences between these two Ersaeids.

Fig. 6 (page 101) and fig. 7 (page 109) of his work do show differences between *Ersaea picta* and *Ersaea Bojani*. CHUN on page 101 tells us, when he describes the bract of *E. picta* that sometimes "gelegentlich neben dem Mittelzahn der Rand mit schärferen Zähnchen aus-"gestattet ist".

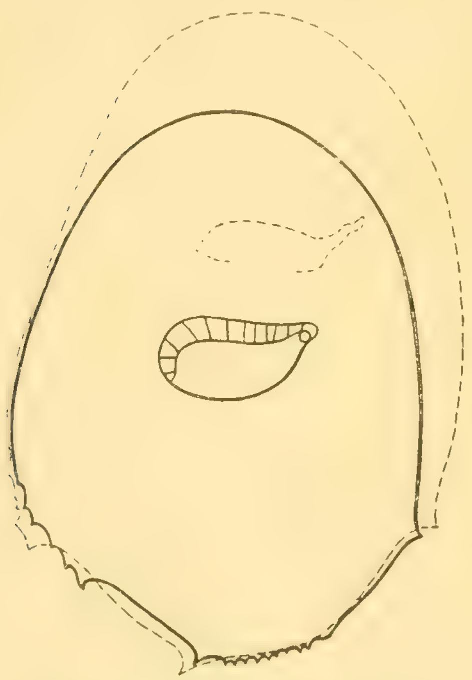


Fig. 1. The sketches given by CHUN 92 of *Ersaea bojani* Huxl. (dotted lines) and of *Ersaea picta* Ch. superposed.

As soon as this serrated part near the middle-tooth is not visible in some of the specimens, the extraordinary resemblance between fig. 6 and 7 is only too clear, always as concerns the outline of the bract.

We have copied these two figures of CHUN's and laid them one on the other, the dotted outlines belong to *Ersaea Bojani*, the black to *Ersaea picta*. One sees how especially the basal part of the one nearly fits on the other (textfig. 1).

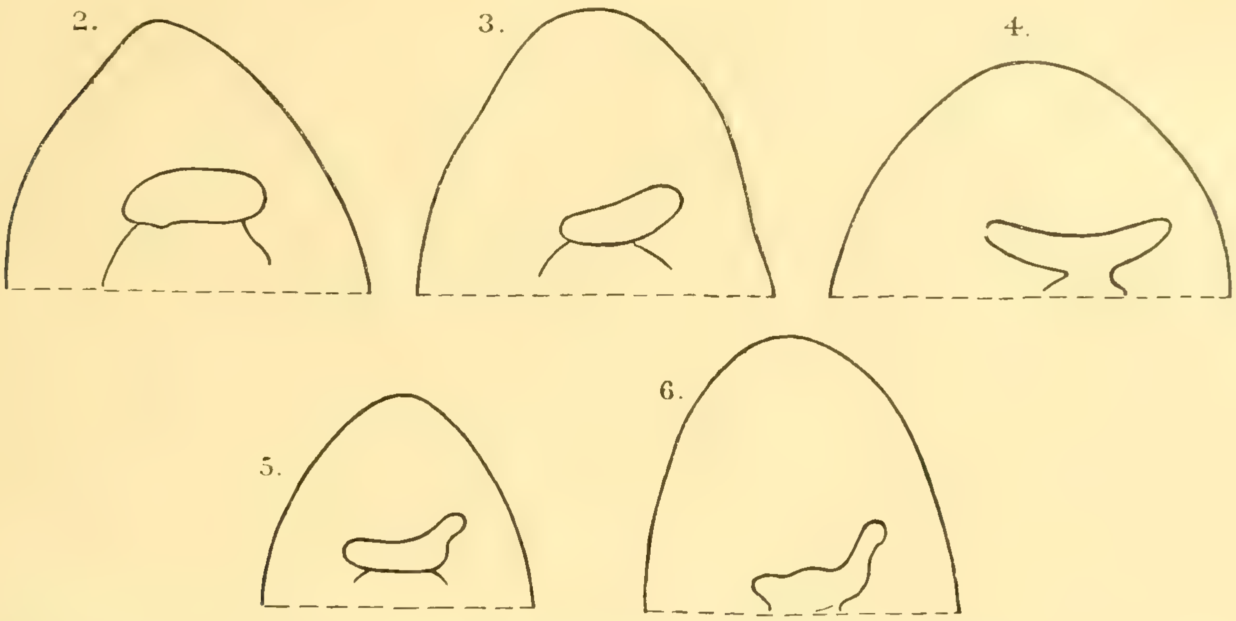
The phyllocyst of *Ersaea picta* is absolutely rounded superiorly, nearly eggshaped; that of *Ersaea Bojani* is drawn out proximally on the right side of the bract into a more or less tubular canal, which ends sometimes obtusely. This would indeed be a good characteristic difference between these two species, if the Siboga expedition had not brought material in which there are not only CHUN's types of fig. 6 and 7 but also many gradations from one to the other.

We just give the outlines of the phyllocyst of 5 specimens in our material which clearly show the transition from the *Ersaea picta* to the *Ersaea Bojani*-type (textfigures 2—6).

In this way we do not find any reason for not throwing together *Ersaea Bojani* and *Ersaea picta*, keeping the oldest name, given by ESCHSCHOLTZ as the definite one.

Part of CHUN's description is, as far as we can make out, not quite consequent. When he speaks (on page 99) of using two different specific names for atlantic and pacific Ersaeids, and when furtheron he tries to show the differences in structure between both species, he never ought to have said on page 109 (speaking of material of *Ersaea Bojani*, caught between the Sandwich Islands and the Carolines, real pacific material) "Was ihre Grösse, die Form des "Deckstückes und die Gestalt der Spezialschwimmglocke anbelangt, so stimmen die Exemplare "so vollkommen mit den atlantischen Ersäen überein, dass ich auf eine eingehendere Schilderung "die nur Bekanntes wiederholen würde, verzichte". And then he speaks of the differences between *Ersaea picta* and *Bojani*. We tried in vain to find out exactly what he means.

The Siboga expedition collected 56 complete specimens, 4 loose bracts and 2 loose special nectophores. It is useless to give any detailed description as CHUN gave a very clear one of the special nectophores, the stem and its appendages and our specimens do not differ in the essential points from the Atlantic *Ersaea Bojani*.



Figg. 2—6. Gradual transitions from the *Ersaea picta*-type of phyllocysts into the *Ersaea bojani*-type after specimens of *Ersaea bojani* Huxl. in the Siboga material. (*Cat.* 42 E, 42 E, 172 E, 42 E, 134 M) 10 .

We have spoken about the slow graduation from the *Ersaea picta* to the *Ersaea Bojani*-type in the phyllocyst, as is also shown in figg. 2—6 of the text. We may only just add that the serration of the outer wall of the bract shows so many variations that it is absolutely useless to give a description of these sixty bracts.

Halopyramis Chun.

3. *Halopyramis adamantina* Ch.

= ? *Enneagonum* Q. et G. 27.
= ? *Diphyes* Q. et G. 33.
= ? *Cymba* Eschsch. 29.
= *Enneagonum* de Bl. 34.
= *Enneagonum* Less. 43.
= *Abyla* Huxl. 59.
= *Cymba crystallus* Hkl. 88*a* and 88*b*.
= *Halopyramis adamantina* Ch. 88 and 92.

Stat. 89. Pulu Kaniungan Ketjil. *Cat.* 48 C. formald. 4°/₀. One specimen.
Stat. 106. Anchorage of Kapul-island, Sulu-Archipelago. *Cat.* 91 A. formald. 4°/₀. 2 specimens.
Stat. 141. Lat. 1° 0'.4 S., Long. 127° 25'.3 E. *Cat.* 44 F.A. formald. 4°/₀. 3 specimens.
Stat. 144. Anchorage North of Salomakië-(Damar-)island. *Cat.* 122 I. formald. 4°/₀. One specimen.
Stat. 210a. Lat. 5° 26' S., Long. 121° 18' E. *Cat.* 139. alc. 90°/₀. One specimen.

Cuboides Q. et G.

4. *Cuboides adamantina* Ch. 88.

= *Cuboides vitreus* Q. et G. 27.
= *Diphyes cuboides* Q. et G. 33.
= *Cymba cuboides* Eschsch. 29.
= *Cuboides vitreus* Huxl. 59.
= *Cuboides adamantina* Ch. 88.
= *Cuboides crystallus* Hkl. 88*b*.
= *Cuboides adamantina* Ch. 92.

Stat. 109. Anchorage off Pulu Tongkil, Sulu-archipelago. *Cat.* 34 C.B. alc. 90°/₀. One specimen.
Stat. 112. Lat. 3° 1′ N., Long. 122° 2′ E. *Cat.* 91 B. formald. 4°/₀. 7 specimens.
Stat. 141. Lat. 1° 0′.4 S., Long. 127° 25′.3 E. *Cat.* 44 F.A. formald. 4°/₀. 3 specimens.
Stat. 143. Lat. 1° 4′.5 S., Long. 127° 52′ E. *Cat.* 86 F. alc. 90°/₀. 2 specimens.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 A. formald. 4°/₀. One specimen.
Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 160 B. formald. 4°/₀. One specimen.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 P. formald. 4°/₀. One specimen.
Stat. 169. Anchorage off Atjatuning, West-coast of New Guinea. *Cat.* 55 C. formald. 4°/₀. One specimen.

The seven specimens of *Halopyramis adamantina* Ch. are all very badly preserved, although in formaldehyd 4°/₀. Generally all the Siphonophores of this collection that have been preserved in formaldehyd are in a very much better condition than those that were kept in alcohol 90°/₀. Chun has given such a excellent description and such beautiful drawings (**92** Pl. XI, figg. 1—4) both of *Halopyramis* and *Cuboides* that it is not necessary for us to make sketches of our very imperfect material nor to enter into any detailed description. We may add however that our specimens of *Halopyramis* are much smaller (length 7 mm., breadth 5 mm., while Chun's specimens measured 1 cm. in length and 1 cm. in breadth) than Chun's Atlantic forms.

The twenty-four specimens of *Cuboides adamantina* are for one half preserved in alcohol (and all these are hardly worth mentioning) and for the other half in formaldehyd. Some of these latter are not too bad for drawing from. Not only the *Halopyramis* was smaller than Chun's Atlantic *Halopyramis*, but the same is the case with its eudoxids. All the *Cuboides adamantina* of the Siboga expedition attained only half the size of the Atlantic ones (breadth 4 mm., length 4 mm., Chun gives the measure of 1 cm. breadth and length and 5,8 mm. for the smaller ones).

For a fuller description of this *Monophyid* we refer to Chun's work (**92**).

Ceratocymba asymmetrica nov. spec.
Clausophyes galeata nov. gen. et nov. spec.
Chuniphyes multidentata nov. gen. et nov. spec.

The following three species all of which are new (two of them constituting new genera) belong to those *Siphonophora* to which we cannot for the present give any definite place in

A

Mr. le Prof. MAX WEBER

à

EERBEEK.

(Pays-Bas).

EXPÉDITION DU SIBOGA.

Ci-joint j'ai l'honneur de vous faire parvenir un exemplaire des

Résultats des explorations de l'expédition du Siboga.

Livraison 38.

MAX WEBER.

EERBEEK, le 30 Mai 1908.

ACCUSE RÉCEPTION:

(*Signature*)

On est prié de bien vouloir renvoyer ce billet, en signe de la bonne arrivée de l'envoi.

the system. We describe them between the *Monophyidae* and *Diphyidae* although we do not mean to attach any value to this provisiory position. They must be regarded as quite different from both families. Nor is there any mutual relation between the three species, which we are going to describe separately.

Still they had to be placed somewhere but it should be borne in mind that the position here assigned to them is absolutely provisional.

Ceratocymba Ch.

5. *Ceratocymba asymmetrica* nov. spec. Pl. I, figg. 2—5.

= *Ceratocymba sagittata* Bedot 1904.

Stat. 106. Anchorage of Kapul-island, Sulu-archipelago. *Cat.* 91 Q. formald. 4°/₀. One specimen.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 59 B. alc. 90°/₀. One specimen.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 126 B. alc. 90°/₀. 3 specimens.
Stat. 215[a]. West 1000 M. distant from North point of Kabia-island reef. *Cat.* 128 F. alc. 90°/₀. One specimen.
Stat. 220. Anchorage off Pasir Pandjang, West coast of Binongka. *Cat.* 77 C. formald. 4°/₀. One specimen.

This new species of the very doubtful genus *Ceratocymba* is represented by three complete specimens and five loose bracts.

It differs from the *Ceratocymba*'s, hitherto described (by QUOY and GAIMARD **27**, CHUN **88**, **97** a, BEDOT **1904**, etc.) by the absolute asymmetrical structure of the bract.

We had much difficulty in giving any name to this species, as QUOY and GAIMARD's description of *Cymba sagittata* (**27**) and CHUN's (**88**) of *Ceratocymba spectabilis* (which a few years later (**97** a) he calls *Ceratocymba sagittata* again, as he felt pretty sure about the identity of QUOY and GAIMARD's material and his own) are very far from being sufficiently clear. Still QUOY and GAIMARD's, and CHUN's text denote so many differences from our specimens, that we were really puzzled to find any resemblance with *Ceratocymba* at all. (The name *Cymba* had been abolished by CHUN as it had been used for a Mollusk before QUOY and GAIMARD's time).

It was at the same time impossible to reconstruct this *Ceratocymba* only by the two texts and it is a great pity, that CHUN gave no sketches at all, although this type had not been found again since QUOY and GAIMARD's time.

To help us out of this difficulty, Prof. CHUN was kind enough to send us a splendid complete specimen of *Ceratocymba sagittata*. At the same time he took the trouble to write to us: "Ich möchte nur bemerken, dass die Deckstücke ziemlich variabel sind; bald sind die "hornartigen Fortsätze lang, bald kurz und dadurch erscheint das Deckstück bei einigen Formen "breit, bei anderen schmäler". Comparing his specimen and his text of **88** with our own specimens, there is too much conformity with *Ceratocymba* not to use the same generic name, but the asymmetrical shape, the shape of the phyllocyst and its comparative smallness, force us to use a new specific denomination, for which we chose "asymmetrica".

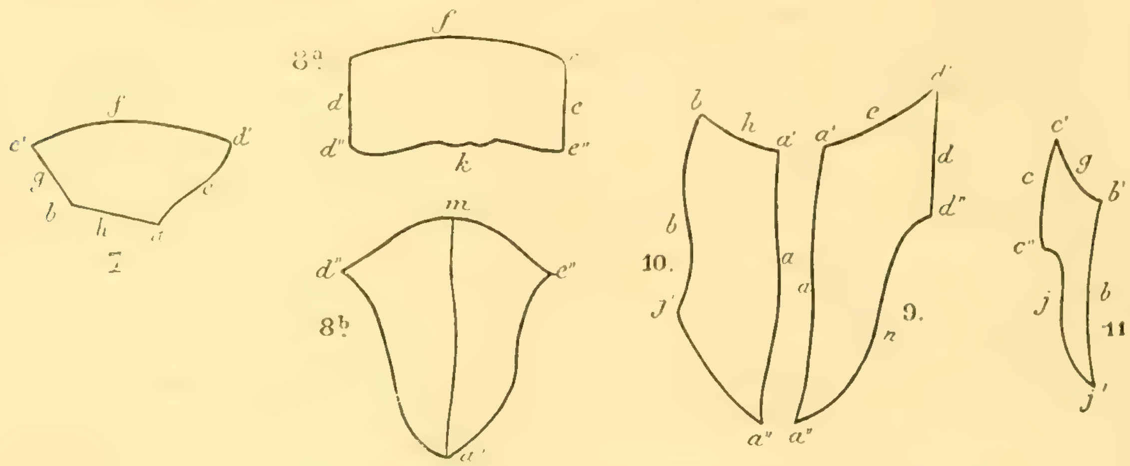
BEDOT **1904** has published a figure of a *Ceratocymba* caught in the Atlantic which is to our opinion absolutely identical with our *Ceratocymba*. He supposes it to be the *Ceratocymba*

sagittata as CHUN described it. For the reasons, stated above, we think it right to maintain our specific determination "asymmetrica". BEDOT's specimens assuredly possess this same structure, though this is not indicated by him. We are sure that as soon as CHUN publishes figures of his *Ceratocymba sagittata*, every one will be struck by the differences which exist in his *Ceratocymba* and in BEDOT's and ours.

We know no more than CHUN or BEDOT, which relation this unknown *Eudoxid* bears to other Siphonophores. The material of the Siboga expedition did not throw any light on this matter.

As BEDOT's description is very incomplete and short, we thought it necessary to give some details of the structure of the bract, which was very well preserved in our specimen. The same cannot be said of the gonocalyx.

We will first describe the bract and show the differences with the other *Ceratocymba*, of which not one specimen was caught by the Siboga expedition.



Figg. 7—11. *Ceratocymba asymmetrica* nov. sp. Different facets of the phyllocyst.
Fig. 7: facet A, Fig. 8*a*: facet B, Fig. 8*b*: facet C, Fig. 9: facet D, Fig. 10: facet E, Fig. 11: facet F. Figg. 7—11 × 5.

The Bract, Length 7—8 mm. Breadth $4\frac{1}{4}$—$6\frac{1}{2}$ mm.

The bract of *Ceratocymba asymmetrica* is composed of six facets.

On the top is an irregularly four-sided facet called A (textfig. 7), of which the angles are blunt (a', b', c', d').

The facet A has an oblique position. The angle a' is situated more to the dorsal side of the bract than the angles d' and b' and these on their part form the gradual transition towards the absolute ventral position of the angles c' and d'. The most proximal ridge f (between c' and d') is longest, a little curved. The next in length is ridge e. If the bract had been symmetrical, ridge e would have been divided into two halves, each having the same length as the ridges g and h and the facet would have been regularly 5-sided. Ridge g and h are a little curved and convex.

This facet A is situated on the top of the bract.

On the ventral side we see a facet B (see textfig. 8*a*) of which f is the upper ridge. Opposite f is ridge k which is somewhat longer but it is not regularly shaped. In the middle it is very much notched. This may possibly be an effect of preservation as the bracts of *Ceratocymba* are very delicate and each facet thin and membranous.

The two lateral ridges *c* and *d* have not a straight course as the two ridges (*f* and *k*) which they unite are not of equal length. Their course is gradually divergent from top to bottom.

The position of facet C is rather difficult to make clear. It is not a true facet but serves at the same time to protect siphon, tentacle and gonocalyx. Proximally it is a true cavity, hollowed out between the dorsal facets, facet D and E, and the ventral facet B. The upper ridge (we may call it ridge, as long as it is a clear definite line separating two facets one from the other) is called *m*. It is curved, meets the ridges *c* and *d* in the angles *d''* and *e''* and goes gradually to the centre of the bract, leaving the surface and is quite imbedded in the centre of the gelatinous substance (see Pl. I, fig. 4).

It is only ridge *m* which is a true ridge, not belonging to any other facet. So the other outline of facet C will be described by the dorsal facets D and E.

It is clear that facet B and C together constitute the ventral side of the bract.

The dorsal side cannot be described without the lateral ones, as there are three facets and the asymmetry is very marked.

As was said above the asymmetry appears on the right side of the bract.

The ridge going down from the angle *b'* is called *b*. It is the dorsal ridge of a four-sided facet called F. This facet is limited on the opposite (the ventral) side proximally by ridge *c* (angles *c'* and *c''*) and distally by ridge *j*. Ridge *j* is very much longer and curved; it unites the much longer ridge *b* to ridge *c* which is shorter.

Ridge *b* is at the same time the left lateral ridge of the fifth facet E (textfig. 10), which is also irregularly four-sided, its proximal ridge *h* being the shortest. The other ridges are *a* (on the right lateral (= dorsal) side) and posteriorly *l*. They are both slightly convex and a little serrated at the angle (*a''*) where they meet. The angle *j'* (connecting ridge *b* and *l*) is also a little serrated.

Of course there exists the same difference in position between the angles *b'* and *a'*, and *j'* and *a''*.

The last facet D (textfigure 9) is one composed quite probably of two.

It consists of ridge *a* on the left (dorsal) side, ridge *e* proximally and ridge *d* on the right (ventral) side; distally we see a ridge *n* which is very distinctly curved in the middle whereas on the opposite side (facet E) there is the angle *j'*. It is this total absence of a ridge that should have begun in the centre of ridge *e* and have run backwards to meet the curved ridge *n* somewhere in the middle of its length (thus constituting a double facet such as we notice on the left) which makes this bract so absolutely asymmetrical.

We have carefully observed the bracts of this species and we did not find the slightest deviation from this particularity in any one of them. It will now have become a great deal easier to understand the shape of the bract as we have sketched it in Pl. I, figg. 2, 3, 4. We see the different facets as we have described them above.

The Phyllocyst.

The phyllocyst (Pl. I, figg. 2, 3, 4 *phyl.*) bears much resemblance to that of *Amphiroa alata* Les. It has the same two wings although longer and narrower; laterally it is flattened on the ventral side of the bract, and the wings begin at the ventral proximal side. They go

straight across the gelatinous substance and it is clear that the branches are ever so much more ventral than the actual body of the phyllocyst (see Pl. I, fig. 4). The dorsal side of the phyllocyst is convex. Distally it narrows suddenly and ends in a club-shaped narrow tube going straight up to the dorsal side of the bract.

Some of these phyllocysts end in a very narrow more thread-like canal (Pl. I, fig. 4). Unfortunately there is no complete specimen well preserved enough to show the point where the siphon is in connection with the phyllocyst.

The three complete specimens have, unluckily, been preserved very badly. There were gonocalyces but it is impossible to give any description at all of them. Only one is not too unworthy of sketching and this can be said only of the distal part. A sketch of this very imperfect part of *Ceratocymba asymmetrica* might perhaps be of some use for later researches (Pl. I, fig. 5).

Bedot was luckier in this case as he gives a sketch (**1904** fig. 1) of a female gonocalyx. The distal part somehow shows some differences, as it seems that the posterior ventral teeth differ in length whilst this does not occur in our specimen.

Clausophyes nobis.

6. *Clausophyes galeata* nov. gen. nov. spec. Pl. I, figg. 6, 7, 8.

Stat. 118. Lat. 1° 38′ N., Long. 124° 28′.2 E. *Cat.* 157 B. formald. 4%. One specimen.

A single nectophore-like structure, resembling an upper nectophore of a *Diphyid* or one of a *Monophyid* such as Chun described (**92**) was found to be absolutely different from any other *Siphonophore* described up to this date.

Its length from top to base is 23 mm. and its greatest breadth 13 mm. The outer surface is smooth, its gelatinous substance very soft, such as the jelly in *Monophyes* and in *Prayidae*. There are two ridges only, but these too are without sharp edges.

This is one of the reasons why we called it *Clausophyes*, after Claus the founder of the family *Monophyidae* (**74**).

We shall see furtheron in which respects it may be perhaps a *Monophyid*, though we cannot find any decisive characteristic and we have provisionally to place *Clausophyes* next to another doubtful and incomplete new genus.

Clausophyes is of a pyramidal structure, its top being obtuse; it has no definite ridges (except the two ventral ones) (Pl. I, fig. 7). It is rounded exteriorly, compressed laterally. On the dorsal side there is a groove which is most prominent at that side (Pl. I, fig. 6) and follows laterally the lines of the nectosac. This looses itself very gradually in the gelatinous substance.

There is a very distinct aperture at the base and anteriorly the contours of a nectosac are seen quite clearly through the jelly. Nothing has been preserved of its wall, but we are quite justified in identifying this campanulate structure with a nectosac. It seems as if on the dorsal side of this new specimen the nectosac approaches quite closely to the outer surface (Pl. I, fig. 6). On the ventral side the contours have become very indistinct and there is no possibility of ascertaining its precise outline.

The aperture is elongated there where in more natural conditions the velum would have

had its place. At the dorsal side of the nectophore-like structure the jelly is thicker; this gradually diminishes. At this point it is rounded; furtheron, more ventrally, it seems as if it becomes ruffled twice. Quite at the ventral basal part of the *Clausophyes* the walls end into two separated curved projections which stand out ventrally. The left point has been destroyed (see ventral fig. 7). Near this point it is not possible to find the contour of the aperture, as little as the ventral wall of the nectosac.

Seen from the ventral side we find many extraordinary characteristics (Pl. I, fig. 7).

First of all it is to be noted that the hydroecial canal (as we may justly call it) is absolutely open, a particularity only known for *Galeolarids* and then only in the inferior nectophores. We do not venture to give any opinion about *Clausophyes* representing a superior or an inferior nectophore. The walls of the hydroecial canal do not touch each other; in some parts they are quite free, in others they are superposed (see ventral fig. 7, Pl. I).

Anteriorly there is situated immediately below the more rounded aperture in the excavation which the two walls have formed, a tiny irregularly shaped structure which magnified 28 times (Pl. I, fig. 8) shows a badly preserved wall. Its contours are anteriorly very clearly designed though the wall itself has withdrawn (see fig. 8). Posteriorly the wall has remained in its place but the outlines are quite as irregular. At its base we see a microscopically fine thread-like canal which is only visible for a small distance and suddenly looses itself, no trace of it being left in the gelatinous substance. As little as we can make out whether this nectophore is superior or inferior, so we are unable to say whether we consider this membranous structure at the top of the nectophore a true somatocyst, or part of the canal which has united superior and inferior nectophore. The bad state of preservation is also one of the causes of our indecision.

If this nectophore should be an inferior one it is certainly one of the very largest that ever was found. But we wonder what the shape of the hydroecial canal of the superior must have been, when we see the rounded obtuse outline of the apex of this nectophore.

Chuniphyes nobis.

7. *Chuniphyes multidentata* nov. gen. nov. spec. Pl. I, figg. 9—11; Pl. II, figg. 12—15.

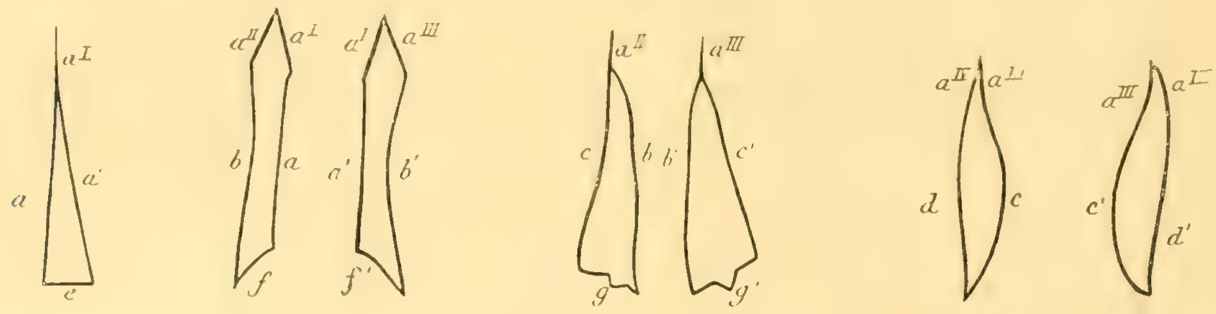
Stat. 141. Lat. 1°0'.4 S., Long. 127°25'.3 E. *Cat.* 44 F.I. One superior nectophore and *Cat.* 44 F.J. One inferior nectophore. formald. 4°/₀.

We first describe the superior nectophore. At the same station we found a loose inferior one. There is every reason to believe that these two belong together. Still this conclusion cannot be decisive as it is only the outward resemblance and not any distinct feature, such as a broken canal (which would have connected the two) that was to be found either on the one or the other, by which we are guided. At any rate both nectophores are each of them totally different from any other *Siphonophore* described up to this date. *Chuniphyes* is the second of the new genera which have no definite place marked in the system.

Superior nectophore (Pl. I, figg. 10, 11, 12). Length 17 mm., breadth 6 mm. The nectophore is of a pyramidal shape; the gelatinous substance is crystalline, both soft and elastic. The ridges stand out clearly as they are prominent and slightly differing in colour from the

rest of the jelly; macroscopically they show distinct brownish-coloured outlines. At first sight they resemble in structure the lines which are to be seen along the ridges of *Abyla bassensis*' superior and inferior nectophores.

To give a better idea of the position of all these ridges we made sketches of the different facets.



Figg. 12—18. *Chuniphyes multidentata* nov. gen. nov. spec. Facets of the superior nectophore.
Fig. 12: facet A, Fig. 13: facet B, Fig. 14: facet B′, Fig. 15: facet C, Fig. 16: facet C′, Fig. 17: facet D, Fig. 18: facet D′.
Figg. 12—18: 2 ×.

The pyramid consists at the apex of four ridges. To distinguish them we call the dorsal one a^I, the right lateral one a^{II}, the left lateral one a^{III}, the ventral one a^{IV}. These devide themselves (about 5 mm. from the top) each on the same height as the others into two, and in this way there are soon eight ridges and eight facets. Some of them (see furtheron) are microscopically very delicately serrated.

We begin with the two ridges, which arise from the principal dorsal one (textfig. 12). We call the ridge on the right side a, on the left side a'. All the accents are given to the ridges on the left side of the nectophore, the facets bear the capital letters A, A′, B, B′, C, C′, D, D′.

Facet A (textfig. 12), the most proximally situated facet, consists of the ridges a and a' and is elongated; at its base is ridge e. The side-ridges (a and a') are about 6 times longer than e. Ridge e is straight. The shape of facet A is elongated triangular. On the right and left side of facet A are facet B and B′. They consist (textfigg. 13, 14) of 5 ridges each, a, a^I, a^{II}, b and f for facet B and a', a^I, a^{III} and ridge f' for facet B′.

As a and b (and a' and b') differ in length at the base, it follows that ridge f (resp. f') has an oblique course.

The facets B and B′ do not differ from each other but of course they are not of the same shape as A′, because they are the intermediate facets between the original four ridges; they continue to the top of the nectophore.

Facet C and C′ (textfigg. 15, 16) are three-sided again as facet A is and consist resp. of ridges b, c and g and b', c' and g'.

The ridges g and g' are strangely divided into two again and form a line bearing a resemblance to the letter Z.

The facet D and D′ (textfigg. 17, 18) consist of the junction of a^{IV} with ridge c on the right side and of a^{III} and c' on the left side. Most ventrally the ridge a^{IV} is the one which connects partially D and D′. But distally a^{IV} divides itself into d and d'. This unison of two

ridges is total and the one ridge composed of these two has a convex course. They form with the opposite ones, the outer lines of the hydroecial canal.

Facet A′ is (as may be concluded from the description of its two neighbours D and D′) a very doubtful facet, as we may never speak about a facet when we mean a cavity.

The posterior points, the bases of the longitudinal eight ridges are all very slightly serrated; this is only to be seen by magnifying about 30 times.

This schematical description should be considered as a reconstruction of a nectophore, which through bad preservation (it is very much altered especially a little way under the apex) does not show all the particularities in a normal way.

We spoke of the hydroecial canal which is open from the base to 5 mm. under the apex (length of ridge a^{IV}) and we will now try to make clear what the interior of the nectophore is like (Pl. I, fig. 9). First of all the contours, the exact position and shape of the nectosac are absolutely invisible. The aperture has probably been between ridge *e*, *f*, *f′* as *g* and *g′* belong more to the hydroecium, that is to say the antero-ventral part of the nectophore. At the basal and ventral part of the nectophore (immediately below the point where the lateral walls of the hydroecium grow divergent) there is a remarkable structure, which magnified shows the following shape (Pl. II, fig. 12).

There are three canals diverging from a central membranous part. The anterior one (Pl. II, fig. 12 *a.c.*) goes up to the apex of the nectophore, grows thinner and thinner and disappears, then the contours are still to be seen, though very indistinctly and it seems as if the canal widens first and then narrows again and the canal gets as thread-like as in the beginning and disappears gradually near the top, the exact position not to be found.

The right lateral one (Pl. II, fig. 12 *r.c.*) loses itself almost immediately, the left lateral one (Pl. II, fig. 12 *l.c.*) passes very soon under another appendage and ends abruptly only just appearing on the other side.

This appendage, so strangely divided into three, may we call it a somatocyst?

The stem is not so enigmatical. Its appendages consist of a multitude of buds at the basal undivided part of the so-called somatocyst and the true stem begins at the back side of this same structure. But at this point all the appendages except a few buds, placed on regular intervals one from the other, disappear. In fact every part of stem and appendages is remarkably incomplete.

Inferior nectophore. (Pl. II, figg. 13, 14, 15).

The loose inferior nectophore has the same outward appearance as the superior one, as concern its elasticity and the brownish colour of the prominent ridges.

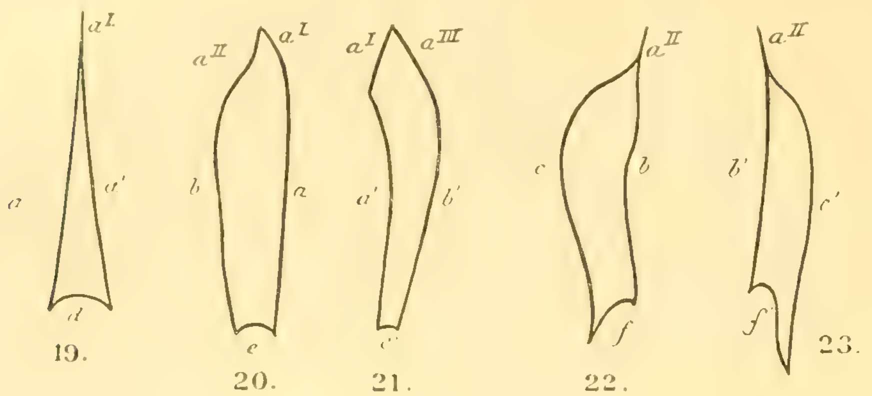
Its length is 22 mm., its breadth 7 mm.

At its top we see three ridges, a difference with the upper nectophore where there were four.

These three ridges bifurcate on different heights. The dorsal ridge (textfig. 19) of facet A (a^I) divides itself about 5 mm. from the top and the two side ridges (*a* and *a′*) grow divergent gradually. At the base is ridge *d* which is curved, so that the two side ridges end pointed. The shape of this facet is much the same as the one in the upper nectocalyx. Through the

conservation however, a' is situated less on the surface than a. In this way the facet thus formed cannot be said to be absolutely dorsal, as it inclines towards the left lateral side.

The facets B and B′ (textfigg. 20, 21) are in this way not of the same shape, as B′ is smaller, more compressed. B is composed of the ridges a^I, a^{II}, a, b and the distal ridge c which is of exactly the same shape as ridge d. The facet B′ consists of a^I, a^{III}, a', b' and c' and is narrower at its base than B. We do not doubt however, that this difference in structure is abnormal and that in living animals the symmetry is maintained.



Figg. 19—23.
Chuniphyes multidentata nov. gen. nov. spec. Facets of the inferior nectophore. Fig. 19: facet A, Fig. 20: facet B, Fig. 21: facet B′, Fig. 22: facet C, Fig. 23: facet C′. Figg. 19—23: 2 ×.

The last facets C and C′ (textfigg. 22, 23) are composed of the ridges resp. a^{II}, its contunuation c, a very long irregularly shaped ridge which is the margin of the open hydroecial canal, and the posterior ridge which is very convex.

C′ is composed of a^{III}, its continuation c' and the same margin of the hydroecial canal on the left side. The irregular shape is a little different and we find here a wing-like excrescence at the superior part which resembles the same characteristic described by us for some very tiny *diphyid*-like loose inferior nectophores (see p.) (Pl. II, figg. 13, 14, 15).

The hydroecial canal is quite open, from top to base, and this is the reason why the space which would have been used for the fourth facet is entirely taken up by the cavity of the hydroecial canal. We have looked in vain for any definite contours of the nectosac, and the shape of the interior of this inferior nectophore is a mystery. This has been occasioned by bad preservation.

The description of the inferior nectophore shows certainly considerable resemblance to the superior one of the same station although the mode of attachment must have been a very singular one. The two nectophores are, to our opinion, new to the system.

Fam. Diphyidae Eschscholtz 29.

I. Tribus Oppositae (Prayomorphae) Ch.

Subfam. Prayinae Köll. 53.

The material of the *Prayinae* in the Siboga expedition is very deficient. They are only four loose nectophores, which through bad preservation have lost all the characteristics which might have been useful towards their specific determination. As it is, we can only give a very brief description and a few sketches.

Praya Ggbr.

8. ? *Praya maxima* Ggbr. 54.

= ? *Praya maxima* Ggbr. 54.

Stat. 185. Lat. 3° 20′ S., Long. 127° 22′.9 E. *Cat.* 49 A. formald. 4°/₀. 2 loose nectophores.

Two loose nectophores (length 19 mm. and breadth 14 mm.; the smaller one $18^1/_2$ mm. and 13 mm.) belong probably to the same specimen. The sketches remind us of GEGENBAUR's *Praya maxima*, and as the whole interior of these nectophores is badly preserved, there is no question of describing it. We have simply before us the gelatinous substance of two nectophores which appear to be allied to *Praya maxima* Ggbr.

Lilyopsis Ch.

9. ? *Lilyopsis diphyes* Vogt. Pl. II, fig. 16.

= ? *Praya diphyes* Vogt. 54.
= ? *Praya diphyes* Köll. 54.
= ? *Praya diphyes* Huxl. 59.
= ? *Lilyopsis diphyes* Ch. 85.

Stat. 276. Lat. 6° 47′.5 S., Long. 128° 40′.5 E. *Cat.* 156. formald. 4°/₀. 3 loose nectophores.

One of the three nectophores is absolutely torn and shapeless, the two others are not much better and do not differ from the description given by HUXLEY. HUXLEY himself was very careful in giving any definite specific name to his only loose nectophore. We are in the same position and confer the name of *Lilyopsis diphyes* only with the greatest reserve.

The length of the two nectophores is $8^1/_2$ and 7 mm., the breadth 5 and $5^1/_2$ mm.; in this respect they are smaller than any other *Prayid* described up to this date.

In both nectophores there are remnants of somatocyst, stem and appendages and it is to be noted that in the smaller one the hydroecial aperture is situated in the middle of the ventral part only and that it does not extend to the anterior part of the nectophore.

II. Tribus Superpositae (Diphymorphae) Ch.

Subfam. Abylinae L. Agassiz 62.

Abyla Eschsch.

10. *Abyla pentagona* Q. et G. 27. Pl. II, figg. 17, 18, 19, 20.

= ? *Pyramis tetragona* Otto 23.
= *Calpe pentagona* Q. et G. 27.
= *Abyla pentagona* Eschsch. 29.
= *Diphya tetragona* Costa 34.
= *Abyla pentagona* Lkt. 53.
= *Aglaisma pentagonum* Lkt. 53.

= *Abyla pentagona* Köll. 53.
= *Abyla trigona* Vogt 54.
= *Abyla pentagona* Lkt. 54.
= *Abyla pentagona* Huxl. 59.
= *Abyla pentagona* Ggbr. 60.
= *Abyla pentagona* Kef. Ehl. 61.
= *Abyla pentagona* Fewk. 79.
= *Calpe gegenbauri* Hkl. 88 *b*.
= *Calpe huxleyi* Hkl. 88 *b*.
= *Abylopsis pentagona* Ch. 88.
= *Abyla (Abylopsis) pentagona* Ch. 97 *a*.
= *Abyla tetragona* Schneider 98.

Stat. 36. Lat. 7° 38' S., Long. 117° 31' E. *Cat.* 41 B. alc. 90°/₀. One inferior nectophore.
Stat. 66. Bank between Islands of Bahuluwang and Tambolungan, South of Saleyer. *Cat.* 140 B. alc. 90°/₀. 7 superior nectophores.
Stat. 106. Anchorage of Kapul-island, Sulu-archipelago. *Cat.* 91 G. formald. 4°/₀. One superior nectophore.
Stat. 109. Anchorage off Pulu Tongkil Sulu-archipelago. *Cat.* 87 C. formald. 4₀/°. One inferior nectophore and *Cat.* 34 C.D. alc. 90°/₀. One complete specimen, one superior, one inferior loose nectophore.
Stat. 112. Lat. 3° 1' N., Long. 122° 2' E. *Cat.* 76 A. alc. 90°/₀. One superior, one inferior nectocalyx.
Stat. 117ᵃ. Lat. 1° 15' N., Long. 123° 37' E. *Cat.* 119 D. formald. 4₀/°. 3 superior nectophores and *Cat.* 137 D. alc. 90°/₀. One superior nectophore.
Stat. 118. Lat. 1° 38' N., Long. 124° 28'.2 E. *Cat.* 157 C. formald. 4°/₀. One inferior nectophore.
Stat. 119. Lat. 1° 33'.5 N., Long. 124° 41' E. *Cat.* 32 B. formald. 4°/₀. One inferior nectophore.
Stat. 121. Menado-anchorage. *Cat.* 39 A. formald. 4°/₀. 2 complete specimens, 2 superior nectophores.
Stat. 128. Lat. 4° 27' N., Long. 125° 25'.7 E. *Cat.* 43 A. alc. 90°/₀. 2 superior nectophores.
Stat. 136. Ternate-anchorage. *Cat.* 80 N. formald. 4°/₀. One complete specimen, 7 superior, 3 inferior nectophores.
Stat. 141. Lat. 1° 0'.4 S., Long. 127° 25'.3 E. *Cat.* 44 F.B. formald. 4°/₀. One superior nectophore.
Stat. 143. Lat. 1° 4'.5 S., Long. 127° 52'.6 E. *Cat.* 229. formald. 4°/₀. 2 complete specimens and *Cat.* 86 E. alc. 90°/₀. One complete specimen, 5 superior nectophores.
Stat. 144. Anchorage North of Salomakiëe (Damar-)island. *Cat.* 122 E. formald. 4°/₀. 11 superior, 7 inferior nectophores.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 160 C. formald. 4°/₀. 8 complete specimens and *Cat.* 59 C. alc. 90°/₀. 2 complete specimens, 5 superior nectophores.
Stat. 157. Lat. 0° 32'.9 S., Long. 130° 14'.6 E. *Cat.* 38 A. formald. 4°/₀. 4 complete specimens, 1 superior, 5 inferior nectophores and *Cat.* 198 A. alc. 90°/₀. 13 inferior nectophores.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs) East-coast of Misool. *Cat.* 164 D. formald. 4°/₀. One complete specimen, 8 superior, 7 inferior nectophores and *Cat.* 148 B.G. alc. 90°/₀. 2 complete specimens, 11 superior, 7 inferior nectophores.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 C. formald. 4°/₀. One complete specimen, 2 superior nectophores.
Stat. 169. Anchorage off Atjatuning, West-coast of New Guinea. *Cat.* 55 F. formald. 4°/₀. One complete specimen, 8 superior, 2 inferior nectophores.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 C. formald. 4°/₀. 8 superior, 3 inferior nectophores.
Stat. 177ᵃ. Lat. 2° 24'.5 S., Long. 129° 38'.5 E. *Cat.* 95 C. alc. 90°/₀. 2 superior nectophores.
Stat. 185. Lat. 3° 20' S., Long. 127° 22'.9 E. Manipa-strait. *Cat.* 100 C. formald. 4°/₀. One complete specimen, one superior, 3 inferior nectophores.

Stat. 189ª. Lat. 2° 22 S., Long. 126° 46′ E. *Cat.* 65 D.N. formald. 4°/₀. One inferior nectophore.
Stat. 203. Lat. 3° 32.5 S., Long. 124° 15′.5 E. *Cat.* 126 D. alc. 90°/₀. One complete specimen, 11 superior, 7 inferior nectophores.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.D. alc. 90°/₀. 2 superior nectophores.
Stat. 213. Saleyer-anchorage and surroundings, including Pulu Pasi Tanette, near the North point of Saleyer-island. *Cat.* 78 A. alc. 90°/₀. 3 complete specimens, 7 superior, 8 inferior nectophores.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 B. formald. 4°/₀. 2 superior nectophores.
Stat. 225. 5700 M. N. 279° E. from South-point of South-Lucipara-island. *Cat.* 45 C. alc. 90°/°. One inferior nectophore.
Stat. 243. Lat. 4° 30′.2 S., Long. 129° 25′ E. *Cat.* 158 B. formald. 4°/₀. One superior, one inferior nectophore.
Stat. 282. Lat. 8° 25′.2 S., Long. 127° 18′.4 E. Anchorage between Nusa Besi and the N.E. point of Timor. *Cat.* 51 D. alc. 90°/₀. 2 complete specimens.

Aglaisma Hkl.

11. *Aglaisma cuboides* Lkt. Pl. II, fig. 21.

= *Eudoxia cuboides* Lkt. 53.
= Einzeltiere von *Abyla pentagona* Ggbr. 54.
= *Eudoxia cuboides* Ch. 85.
= *Aglaisma gegenbauri* Hkl. 88*a*.
= *Eudoxia cuboides* Bedot 96.
= *Aglaisma cuboides* Ch. 97.

Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.B. formald. 4°/₀. One specimen.
Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands Sulu-archipelago. *Cat.* 79 A. alc. 90°/₀. One specimen.
Stat. 96. South-east side of Pearl-Bank Sulu-archipelago. *Cat.* 99 D. alc. 90°/₀. One specimen.
Stat. 99. Lat. 6° 7′.5 N., Long. 120° 26′ E. *Cat.* 70 C. alc. 90°/₀. One specimen.
Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 K. formald. 4°/₀. One specimen.
Stat. 109. Anchorage off Pulu Tongkil, Sulu-archipelago. *Cat.* 34 C.C. alc. 90°/₀. 3 specimens.
Stat. 117ª. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 D. formald. 4°/₀. 9 specimens and *Cat.* 137 D. alc. 90°/₀. 2 specimens.
Stat. 121. Menado-anchorage. *Cat.* 39 D. formald. 4°/₀. 2 specimens.
Stat. 128. Lat. 4° 27′ N., Long. 125° 25′.7 E. *Cat.* 43 B. alc. 90°/₀. 15 specimens.
Stat. 141. Lat. 1° 0′.4 S., Long. 127° 25′.3 E. *Cat.* 44 F.D. formald. 4°/₀. One specimen and *Cat.* 147 A. alc. 90°/₀. One specimen.
Stat. 143. Lat. 0° 4′.5 S., Long. 127° 52′.6 E. *Cat.* 86 H. alc. 90°/₀. 18 specimens.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 H. formald 4°/₀. 8 specimens.
Stat. 146. Lat. 0° 36′ S., Long. 128° 52′.7 E. *Cat.* 64 B. formald. 4°/₀. One specimen.
Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 59 B. alc. 90°/₀. 5 specimens.
Stat. 149. Fau-Anchorage and lagune. West-coast of Gebe-island. *Cat.* 66 C. alc. 90°/₀. 12 specimens.
Stat. 157. Lat. 0° 32′.9 S., Long. 130° 14′.6 E. *Cat.* 198 B. alc. 90°/₀. One specimen.
Stat. 165. Anchorage on North-east side of Daram-islands (False Pisangs) East-coast of Misool. *Cat.* 164 J. formald. 4°/₀. 4 specimens and *Cat.* 148 B.D. alc. 90°/₀. 8 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 D. formald. 4°/₀. One specimen.
Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 D. formald. 4°/₀. 3 specimens and *Cat.* 149 C. alc. 90°/₀. 2 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 D. formald. 4°/₀. 2 specimens.

Stat. 177[a]. Lat. 2° 30′ S., Long. 129° 28′ E. *Cat.* 95 D. alc. 90°/₀. 7 specimens.
Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. *Cat.* 142 B. alc. 90°/₀. 2 specimens.
Stat. 185. Lat. 3° 20′ S., Long. 127° 22′.9 E. *Cat.* 100 B. formald. 4°/₀. One specimen.
Stat. 189[a]. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.G. formald. 4°/₀. 2 specimens and *Cat.* 127 F.A. alc. 90°/₀. 8 specimens.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.C. formald. 4°/₀. One specimen.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 126 B. alc. 90°/₀. 8 specimens.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.C. alc. 90°/₀. 5 specimens.
Stat. 243. Lat. 4° 30′.2 S., Long. 129° 25′ E. *Cat.* 134. alc. 90°/₀. One specimen.
Stat. 245. Lat. 4° 16′.5 S., Long. 130° 15′.8 E. *Cat.* 143 F. alc. 90°/₀. 7 specimens.
Stat. 315. Anchorage East of Sailus Besar, Paternoster-islands. *Cat.* 129 C. alc. 90°/₀. One specimen.

The Siboga expedition has brought together a most splendid collection of *Abyla pentagona* (33 complete specimens, 98 loose superior nectophores, 79 loose inferior nectophores), one of the *Calycophorids* which has been found in great profusion in the Atlantic Ocean and which has been described by a great many authors (Köll. **54**, Lkt. **53**, Hkl. **88b** etc.).

From the Indian and the Pacific Ocean (south-east coast of New Guinea, Indian Ocean off Timor, in the South Pacific) Huxley (**59** p. 41) describes under the same name a smaller specimen which he thinks identical with the *Abyla pentagona* of Kölliker **54**, Leuckart **54**, Gegenbaur **60** etc. At the same time he recapitulates how Leuckart **53** describes under the name of *Aglaisma pentagonum*, an exceedingly small *Abylid* (8 mm.) which is to his opinion identical with the *Abyla pentagona* of Quoy and Gaimard and which Leuckart himself calls a "unvollständig entwickelte *Abyla pentagona* (**53** p. 53)". Later authors as Haeckel **88b** and Chun **88** and **97a** think Huxley's specimens different and Haeckel even calls it *Calpe huxleyi* (**88b** p. 164).

Now the Siboga expedition not only brought many large specimens but also a considerable number of smaller ones, but we looked in vain for any other specific difference.

In the description of *Abylopsis quincunx* we will give our opinion as to the position of Huyley's specimen in the system.

It was very remarkable to find such great differences in size between the respective specimens. The length of the very largest *Abyla pentagona* was 24 mm. (measured from the superior facet of the superior nectophore to the utmost point of the proximal ridge in the inferior one) of the smallest 12 mm. (measures taken as above). We give three sketches (Pl. II, figg. 17, 18, 19) of the superior nectophore of *Abyla pentagona*, which we use in comparing them with the same in *Abylopsis quincunx* Ch. (see p. 22). All the inferior nectophores possess the characteristic course of the canals such as Gegenbaur (**60** p. 354) described so well.

The principal canal divides itself at once at the apex in the superior hindwall of the nectophore into four canals.

The proximal one first follows the upperwall of the nectosac, then goes straight down, ending below in an enlargement. The distal canal follows the hindwall of the nectosac and shows the same enlargement near the velum. But it does not end there, but gives off a short canal, the course of which is proximal to the left and this short canal ($^1/_6$ of the length of the main posterior one) ends also in a club-shaped enlargement. The right lateral canal follows the

usual course along the wall of the nectosac first superiorly, then laterally and shows the same dilatation towards its base. The left lateral one goes first straight down, ends suddenly blindly at $^{2}/_{3}$ of the whole length of the nectosac. A side canal begins a little higher, goes on proximally and bends itself. Its course is then a perfectly straight one; it ends in the same club-shaped enlargement. All these enlargements are in connection with one another through a ring-canal which runs along the velum. We carefully looked over all the inferior nectophores (± 20) and always found this same structure both in small and in big specimens. We could not find any other specific differences and so we do not feel justified to use two different specific names.

The *eudoxids* of *Abyla pentagona* "*Aglaisma cuboides*" Lkt. (**53**) have been described so well by many authors that we need not repeat anything. We only want to give a sketch of one of the 147 specimens captured by the Siboga and we wish to draw the attention to the great conformity between the list of stations of *Abyla pentagona* and its *eudoxid Aglaisma cuboides* Lkt. The latter were nearly all of the same size.

We will use *Aglaisma cuboides* in the description of *Aglaismoides* to compare the differences between the *Eudoxids* of two so different *Abylids*.

Abylopsis Ch.

12. *Abylopsis quincunx* Ch. Pl. III, figg. 22, 23, 24, 25, 26, 27.

= *Abylopsis quincunx* Ch. 88.
= *Abylopsis quincunx* Bedot 96.
= *Abyla (Abylopsis) quincunx* Ch. 97a.
= *Abyla pentagona* A. G. Mayer 1900.
= *Abyla quincunx* A. Ag. et A. G. Mayer 98, 1902.

Stat. 66. Bank between islands of Bahuluwang and Tambolungan, South of Saleyer. *Cat.* 140 C. alc. 90°/₀. 2 superior, one inferior nectophore.
Stat. 89. Pulu Kaniungan Ketjil. *Cat.* 48 D. formald. 4°/₀. 2 superior nectophores.
Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 B. alc. 90°/₀. One superior nectophore.
Stat. 96. South-east of Pearl-bank. Sulu-archipelago. *Cat.* 99 C. alc. 90°/₀. 10 superior nectophores.
Stat. 104. Sulu-harbour, Sulu-island. *Cat.* 103 D. alc. 90°/₀. One inferior nectophore.
Stat. 105. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 F. formald. 4°/₀. 2 superior, 2 inferior nectophores.
Stat. 118. Lat. 1° 38′ N., Long. 124° 28′.2 E. *Cat.* 93 B.C. alc. 90°/₀. One superior nectophore.
Stat. 121. Menado-anchorage. *Cat.* 39 C. formald. 4°/₀. One superior nectophore.
Stat. 136. Ternate-anchorage. *Cat.* 80 R. formald. 4°/₀. One inferior nectophore.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 C. formald. 4°/₀. One superior nectophore.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 E. formald. 4°/₀. 2 complete specimens, 6 superior, 6 inferior nectophores.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 C. formald. 4°/₀. 3 superior nectophores.
Stat. 165. Anchorage on North-east side of Daram-islands (False Pisangs), East-coast of Misool. *Cat.* 148 B.A. alc. 90°/₀. One inferior nectophore and *Cat.* 164 J. formald. 4°/₀. 2 superior, one inferior nectophore.
Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 F. formald. 4°/₀. 3 superior nectophores.

Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 C. formald. 4°/₀. 3 complete, 24 superior, 9 inferior nectophores.
Stat. 177ᵃ. Lat. 2° 30′ S., Long. 129° 28′ E. *Cat.* 95 B. alc. 90°/₀. 19 superior nectophores, one inferior nectophore.
Stat. 184. Anchorage off Kampong Kelang, South coast of Manipa-island. *Cat.* 142 A. alc. 90°/₀. One superior, one inferior nectophore.
Stat. 186. Lat. 3° 10′.5 S., Long. 127° 20′.5 E. *Cat.* 25 V.A. formald. 4°/₀. One superior nectophore.
Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.D. formald. 4°/₀. One complete, 4 superior nectophores and *Cat.* 127 F.D. alc. 90°/₀. 15 superior, 8 inferior nectophores.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.B. formald. 4°/₀. 2 superior, 2 inferior nectophores.
Stat. 194—197. (194 = Lat. 1° 53′.5 S., Long. 126° 39′ E. 195 = Lat. 1° 55′ S., Long. 126° 50′.7 E. 196 = Lat. 1° 52′.8 S., Long. 127° 6′ E. 197 = Lat. 1° 45′.3 S., Long. 127° 8′.3 E.). *Cat.* 75 B.D. alc. 90°/₀. One superior nectophore.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.D. alc. 90°/₀. 3 superior nectophores.
Stat. 213. Saleyer-anchorage and surroundings, including Pulu Pasi Tanette, near the North-point of Saleyer-island. *Cat.* 58 A. formald. 4°/₀. 4 superior nectophores.
Stat. 215ᵃ. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 B. formald. 4°/₀. One superior nectophore.
Stat. 220. Anchorage off Pasir-Pandjang, West-coast of Binongka. *Cat.* 77 B. formald. 4°/₀. 7 superior, one inferior nectophores and *Cat.* 144 C. alc. 90°/₀. 4 superior nectophores.
Stat. 225. 5700 M. N. 279° E. from South-point of South Lucipara-island. *Cat.* 45 F. alc. 90°/₀. One inferior nectophore.
Stat. 252. West-side of Taam-island. *Cat.* 150 B. alc. 90°/₀. 3 superior nectophores.
Stat. 276. Lat. 6° 47′.5 S., Long. 128° 40′.5 E. *Cat.* 138 A. alc. 90°/₀. 5 superior nectophores.

We have applied Chun's name *Abylopsis quincunx* to those *Abylids*, which are of small size and which differ from the *Abyla pentagona* in many other respects. Chun writes **97 a** (p. 29): "Ich habe neuerdings Gelegenheit gefunden, dieselbe (that is *Abylopsis quincunx* Ch.) eingehender "zu untersuchen und finde sie nur in feineren Punkten, welche immerhin eine specifische Tren- "nung rechtfertigen, verschieden".

We find that these minor details are not so inconsiderable as Chun supposes and we mean to show that the differences between *Abyla pentagona* and *Abylopsis quincunx* are in fact very important. The figure given by Chun **97 b** shows at first sight striking differences with the *Abyla pentagona* Q. et G.

Abylopsis quincunx was represented by 6 complete specimens, 125 loose superior and 35 loose inferior nectophores.

When comparing the list of stations of *Abyla pentagona* and of *Abylopsis quincunx* we see that at 15 stations of the former the latter appeared too, so that they may be said to appear frequently together. *Abylopsis quincunx* is very small (complete specimen length not quite 6 mm.) and absolutely transparent but for the calcareous granules in the somatocyst of the superior nectophore. The two figures (Pl. III, figg. 22, 23) of the complete *Abylopsis quincunx* show, at the first view how different the outward appearance is between *Abylopsis* and *Abyla*, especially as far as the inferior nectophore is concerned; not only its size in relation to the superior one, but also its shape.

Superior nectophore.

We intend to compare alternately a superior nectophore of *Abyla pentagona* and a superior

one of *Abylopsis quincunx.* To be absolutely sure that we had taken the right nectophores, we detached them from complete specimens, the complete *Abylopsis quincunx* measuring 6 mm. and the *Abyla pentagona* 23 mm. We found even some complete specimens of *Abyla pentagona* of greater length, but they happened not to be well-preserved enough.

The relative size of superior to inferior nectophore is in both species very different.

The inferior one of *Abylopsis quincunx* is only a little larger (about $1^{9}/_{14}$) and the inferior one of *Abyla* is $4^{1}/_{2}$ times longer than the superior nectophore. This is shown clearly in Chun's figure **97b** of *Abylopsis quincunx.*

This of course makes the outward appearance totally different.

Comparing (Pl. II, figg. 17, 18, 19 with Pl. III, figg. 24, 25, 26) the superior nectophores of the two we find that there is no difference in structure as far as the facets are concerned. First of all the ridges of *Abylopsis* are serrated, especially the ridges of the anterior facet. In *Abyla* there are only remains of serrating in the four ridges which form the apertures of the hydroecial canal.

The upper nectophores of both *Abyla* and *Abylopsis* are four-sided and have two parallel, pentagonal facets, an anterior and a posterior one. This anterior facet in *Abylopsis* (Pl. III, fig. 24) is an almost regular pentagon, the basal ridge being somewhat shorter and curved, whilst in *Abyla* (Pl. II, fig. 17) the same ridges differ in length; the upper ridges are shorter, and the angles which they form with the longer basal ridges of the pentagon are less acute. The basal ridge is only a little convex and much smaller. The ventral facet shows some difference too. In *Abylopsis* (Pl. III, fig. 25) and in *Abyla* (Pl. II, fig. 18) the upper ridges have the same course, but whilst in *Abylopsis* the postero-lateral ridges are straight and begin to bend only at the very distal end abruptly to form the teeth of the hydroecial canal, the same ridges in *Abyla* (Pl. II, fig. 18) are convex and meet each other gradually. The teeth of the hydroecial canal are less sharp and the basal transverse ridge is less emarginate than in *Abylopsis.*

Naturally the differences between the posterior and anterior facets cause dissimilarity in structure of the lateral facets. The two superior lateral facets in *Abylopsis* (Pl. III, fig. 26) form a regular quadrangle; in *Abyla* (Pl. II, fig. 19) there are 4 ridges too, but the superior one (the ridge which connects the superior angles of anterior and posterior facet) is smaller than the inferior one, moreover the latter is curved. This includes a deviation of the lateral ridges and an irregular aspect of the whole.

The infero-lateral ridges are in *Abylopsis* and *Abyla* four-sided, and are produced inferiorly into the lateral wall of the hydroecium. In *Abylopsis* (Pl. III, fig. 26) the angles are more acute, the teeth of the hydroecium are long. In *Abyla* (Pl. II, fig. 19) the angles are blunt and the teeth shorter. The posterior wall of the hydroecium is formed by the posterior facet, the anterior one by a single facet, four-sided, the basal ridge of which is deeply emarginate and serrated. Concluding we may say that the great difference between the superior nectophores of *Abyla* and *Abylopsis* is that in *Abylopsis* all angles are acute, in *Abyla* all blunt. The interior (phyllocyst, nectosac, canals of the nectosac and hydroecium) do not show any dissimilarity to those in *Abyla pentagona.*

As soon as we had found these differences the selection of the very extensive material of both *Abylopsis quincunx* and *Abyla pentagona* was extremely facilitated.

The remains of stem and appendages in superior and inferior nectophore were hardly to be recognized; at any rate the appendages were not well enough preserved to show the structure of the bract, a very important thing for the determination of the *eudoxids*. We therefore hardly feel justified as yet to consider *Aglaismoides Eschscholtzi* Huxley as the *eudoxid* of *Abylopsis quincunx*, though we are inclined to do so, as the Siboga material contains many specimens of this *eudoxid*, there being at the same time except *Aglaisma cuboides* Lkt., *Sphenoides australis* Huxl., *Amphiroa alata* Les., no other *eudoxids* of *Abylids* in the collection.

The inferior nectophore.

The striking difference, at first sight, between the inferior nectophores of *Abylopsis* and *Abyla* is the greater development of gelatinous substance in the former, the broadness in comparison to the latter where the inferior nectophores are $2^1/_3$—3 times longer than the superior and finally the mode of attachment and the outward appearance of the superior part of the distal nectophore (compare our sketches Pl. III, figg. 22, 23 with the sketches given by Köll. **54**, Leuckart **54**, etc. for *Abyla pentagona*).

As the gelatinous substance has so much increased in size, the result is a different aspect of the basal facet, taken when the whole specimen rests on the anterior pentagonal facet of the superior nectocalyx (fig. 27). The whole basal part of the inferior nectophore is very different from the same in *Abyla* as is shown in fig. 20. It is clearly shown how the basal ridges are convex in *Abylopsis*, less in *Abyla*. But the real absolute distinction between *Abylopsis* and *Abyla* is found in the canals of the inferior nectocalyx.

We gave above a description of the course of these canals in *Abyla pentagona* (see p. 20).

We have looked in vain for this same structure in all 35 inferior nectophores of *Abylopsis*. Here they have quite a different course. Anteriorly there are none but the two proximal canals, first following the superior wall of the nectosac. They do not reach its proximal wall but bend down on the side wall and reach the velum on the right and left side of the proximal half. The two other canals are situated in the hind wall and run nearer to each other. They meet in the basal part of the nectosac forming an enlargement which is very much developed.

Chun never mentioned this very characteristic difference between this structure in *Abylopsis* and *Abyla* and it is especially this difference in structure of the canals which prompts us to consider *Abylopsis quincunx* Ch. as absolutely different from *Abyla pentagona* Q. et G.

Huxley described (**59** p. 49, Pl. II, fig. 2) an *Abylid* which he considers to be an *Abyla pentagona*. Later authors Haeckel **88a** and Chun **88** and **97b**, Mayer **98**, A. Ag. and Mayer **1900** consider those specimens to be different. Haeckel calls it *Calpe huxleyi* (**88** p. 164). Chun finds his atlantic *Abylopsis quincunx* identical with Huxley's *Abyla pentagona*. It might be of great value to know the exact course of the canals in the nectosac of the inferior nectophore. Unfortunately Huxley gives no description of them. He refers to Kölliker (**59** p. 43). So we draw the conclusion that they are similar to those in *Abyla pentagona*. Then of course the identification with *Abyla pentagona* would be justified. Huxley's specimens would be simply the smaller ones, as we found them also in our material for *Abyla pentagona* (see p. 20).

Judging after the sketches of A. G. Mayer (**1900**) his *Abyla pentagona* and *Chunia capillaria* are true *Abylopsis* and we would suggest *A. quincunx* Ch. for the former and *A. capillaria* for the latter. We wonder what this "long, slightly curved, brist-like spine" may be. Could it not simply be the stem without its appendages? A. Agassiz and A. G. Mayer published **1902** two sketches of *Abylids* of which one called *Abyla quincunx* is easily to be recognized as the true *Abylopsis quincunx* Ch. But the other called *Abyla Huxleyi* Haeckel seems to us a new species of *Abylopsis*. It is exceedingly large (length 25 mm.) and has the canals in the inferior nectophore which are characteristic of *Abylopsis*. We cannot suppose that these authors overlooked the formation of side branches in these canals and still we are very much surprised to find that they think this specimen to be identical with Haeckel's *Abyla Huxleyi* as we have seen above that this *Abyla Huxleyi* might be a true *Abyla pentagona*. It is to be hoped that the two authors will soon give us a clearer description of their so-called *Abyla Huxleyi*, and also of their *Chunia capillaria*.

Aglaismoides Huxl.

13. *Aglaismoides Eschscholtzii* Huxl. Pl. III, figg. 28—31.

= *Aglaismoides Eschscholtzii* Huxl. 59.
= *Aglaismoides Eschscholtzii* Ch. 88.
= *Aglaismoides quincunx* Ch. 97 *a*.
= *Aglaisma quincunx* A. G. Mayer 1900.
= *Aglaisma quincunx* A. Ag. and A. G. Mayer 1902.

Stat. 66. Bank between islands of Bahuluwang and Tambolungan, South of Saleyer. *Cat.* 140 A. alc. 90°/₀. 33 specimens.
Stat. 89. Pulu Kaniungan Ketjil. *Cat.* 48 B. formald. 4°/₀. 2 specimens.
Stat. 93. Pulu Sanguisiapo. Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 D. alc. 90°/₀. One specimen.
Stat. 96. South-east of Pearl-bank. Sulu-archipelago. *Cat.* 99 E. alc. 90°/₀. 6 specimens.
Stat. 104. Sulu-harbour Sulu-island. *Cat.* 103 E. alc. 90°/₀. One specimen.
Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 M. formald. 4°/₀. 7 specimens.
Stat. 110. Lat. 4° 34′ N., Long. 122° 0′ E. *Cat.* 47 C. formald. 4°/₀. 27 specimens.
Stat. 117ᵃ. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 D. formald. 4°/₀. 3 specimens and *Cat.* 137 D. alc. 90°/₀. One specimen.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 92 C. alc. 90°/₀. 24 specimens.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 H. formald. 4°/₀. One specimen.
Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 59 B. alc. 90°/₀. One specimen.
Stat. 149. Fau-anchorage and lagune. West-coast of Gebé-island. *Cat.* 66 D. alc. 90°/₀. 2 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 D. formald. 4°/₀. 2 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 D. formald. 4°/₀. 2 specimens.
Stat. 177ᵃ. Lat. 2° 30′ S., Long. 129° 28′ E. *Cat.* 95 A. alc. 90°/₀. 220 specimens.
Stat. 186. Lat. 3° 10′.5 S., Long. 127° 20′.5 E. *Cat.* 25 V.B. formald. 4°/₀. One specimen.
Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.M. formald. 4°/₀. 26 specimens add *Cat.* 127 F.B. alc. 90°/₀. 3 specimens.
Stat. 194. Lat. 1° 53.5 S., Long. 126° 39′ E. *Cat.* 23 A.C. formald. 4°/₀. 14 specimens.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 126 B. alc. 90°/₀. 60 specimens.

Stat. 213. Saleyer-anchorage and surroundings, including Pulu Pasi Tanette, near the North-point of Saleyer. *Cat.* 58 E. formald. 4°/₀. One specimen and *Cat.* 78 C. alc. 90°/₀. 2 specimens.

Stat. 215ª. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 D. alc. 90°/₀. one specimen.

Stat. 217. Lat. 6°40'.6 S., Long. 123°14'.7 E. *Cat.* 29 A. alc. 90°/₀. 3 specimens.

Stat. 223. Lat. 5°44'.7 S., Long. 126°27'.3 E. *Cat.* 31 E. alc. 90°/₀. 5 specimens.

Stat. 225. 5700 M. N. 279° E. from South-point of South Lucipara-island. *Cat.* 45 E. alc. 90°/₀. 3 specimens.

Stat. 245. Lat. 4°16'.5 S., Long. 130°15'.8 E. *Cat.* 143 B. alc. 90°/₀. 4 specimens.

Stat. 252. West-side of Taam-island. *Cat.* 150 A. alc. 90°/₀. 7 specimens.

Stat. 276. Lat. 6°47'.5 S., Long. 128°40'.5 E. *Cat.* 138 B. alc. 90°/₀. 2 specimens.

Aglaismoides Eschscholtzii was found in an unusual great number of specimens (± 400) of which one station only (Stat. 177ª) produced about 220.

They were more or less damaged by the preserving fluids and in only a few cases the reproductive swimming-bells were preserved. The beautifully-shaped pentagonal prismatic bract is shown in Pl. III, figg. 28, 29, 30, 31. HUXLEY gives no very clear description of the bract, but his figures (**59** Pl. IV, fig. 2) of this species show the difference between this *Aglaismoides Eschscholtzii* and *Aglaisma cuboides* Lkt., very distinctly. When the bracts are placed in the same position (compare Pl. II, fig. 21 and Pl. III, fig. 30) we see the difference between the beautiful pentagonal shape of *Aglaismoides* and the quadrangular one in *Aglaisma cuboides*.

There is no reason to believe our specimens different from those described by HUXLEY.

CHUN **88** thinks that *Aglaismoides Eschscholtzii* constitutes the detached diphyozooids of his new, small *Abylid*, *Abylopsis quincunx*. He does not however say whether he ever saw the development of one of the groups of appendages in *Abylopsis* into a definite *Aglaismoides Eschscholtzii*.

There were many inferior nectophores in *Abylopsis quincunx* among the Siboga material, the hydroecial canal of which might have contained any distinct young cormidia, showing the structure of an *Aglaismoides*. This however was not the case.

We add some sketches (Pl. III, figg. 28—31) of *Aglaismoides Eschscholtzii* to show the difference with *Abyla pentagona*'s *eudoxids*, the well-known *Aglaisma cuboides* Lkt.

14. *Abyla bassensis* Huxl. 59. Pl. IV, fig. 32.

= *Diphyes bassensis* Q. et G. 33.
= *Calpe bassensis* Less. 43.
= *Abyla bassensis* Huxl. 59.
= *Abyla perforata* Ggbr. 60.
= *Bassia perforata* Ch. 88.
= *Bassia obeliscus* Hkl. 88*a*.

Stat. 89. Pulu Kaniungan Ketjil. *Cat.* 48 A. formald. 4°/₀. One superior nectophore.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 C. formald. 4°/₀. 2 inferior nectophores.

Stat. 136. Ternate anchorage. *Cat.* 80 P. formald. 4°/₀. 4 superior and 3 inferior nectophores and *Cat.* 67 B.A. alc. 90°/₀. 8 superior, 5 inferior nectophores.

Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 C. formald. 4°/₀. One inferior nectophore and *Cat.* 92 B. alc. 90°/₀. One superior nectophore.

Stat. 141. Lat. 1° 0.4 S., Long. 127° 25'.3. *Cat.* 44 F.C. formald. 4°/₀. 3 inferior nectophores.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 E. formald. 4°/₀. 2 superior. 7 inferior nectophores.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 160 C. formald. 4°/₀. One inferior nectophore.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs) East-coast of Misool. *Cat.* 164 B. formald. 4°/₀. One superior, 3 inferior nectophores.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 C. formald. 4°/₀. one complete specimen, 13 superior, 17 inferior nectophores.
Stat. 186. Lat. 3° 10'.5 S., Long. 127° 20'.5 E. North-side of Manipa-strait. *Cat.* 25 V.C. formald. 4°/₀. 2 complete specimens, one inferior nectophore.
Stat. 189ᵃ. Lat. 2° 22' S., Long. 126° 46' E. *Cat.* 65 D.P. formald. 4°/₀. 2 superior nectophores.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 39' E. *Cat.* 23 A.B. formald. 4°/₀. 2 superior, 3 inferior nectophores.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 102 B. formald. 4°/₀. One superior nectophore.
Stat. 210. Lat. 5° 28' S., Long. 121° 23'.5 E. *Cat.* 56 B. formald. 4°/₀. 3 superior nectophores.
Stat. 213. Salayer-anchorage and surroundings including Pulu Pasi Tanette, near the North-point of Saleyer-island. *Cat.* 58 B. formald. 4°/₀. One complete specimen.
Stat. 220. Anchorage off Pasir Pandjang West-coast of Binongka. *Cat.* 77 B. formald. 4°/₀. 2 superior, one inferior nectophore and *Cat.* 144 C. alc. 90°/₀. 2 superior, one inferior nectophore.

Sphenoides Huxl.

15. *Sphenoides australis* Huxl. Pl. IV, fig. 33.

= *Sphenoides australis* Huxl. 59.
= *Sphenoides australis* Ch. 88.
= *Sphenoides obeliscus* Hkl. 88 *b*.

Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.D. formald. 4°/₀. 3 specimens.
Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 D. formald. 4°/₀. 2 specimens.
Stat. 117ᵃ. Lat. 1° 15' N., Long. 123° 37' E. *Cat.* 119 D. formald. 4°/₀. 14 specimens (gonocalyces).
Stat. 136. Ternate-anchorage. *Cat.* 80 D. formald. 4°/₀. 8 specimens.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 B. formald. 4°/₀. 2 specimens.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 F. formald. 4°/₀. 7 specimens.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs) East-coast of Misool. *Cat.* 164 C. formald. 4°/₀. 42 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 D. formald. 4°/₀. 34 specimens.
Stat. 194. Lat. 1° 53.5 S., Long. 126° 39' E. *Cat.* 23 A.C. formald. 4°/₀. 8 specimens.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 102 D. formald. 4°/₀. One specimen.
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 138 J. alc. 90°/₀. 2 specimens.

The first complete description of *Abyla bassensis* was given by Huxley (**59**) for specimens found along the coast of Tasmania (Australia) in 1847. In 1848 he again found *Abyla bassensis* in Bass' Straits and in the South Pacific. He supposes his specimens to be identical with those of Quoy and Gaimard's **33**, notwithstanding the incompleteness of the sketches and the short and insufficient description of these latter authors.

A year later Gegenbaur describes **60** an *Abyla*, which to his opinion is new, and calls it *Abyla perforata*.

Chun takes **88** up the original name of Quoy and Gaimard's, *Bassia*, with the species

perforata of GEGENBAUR for specimens taken near the Canary-islands and finds these identical with *Abyla bassensis* Huxl.

HAECKEL is of opinion that *Abyla bassensis* differs from *Abyla perforata* Ggbr. He describes a new species *Bassia obeliscus* and speaks of a quite new *Abylid* to which he gives the name of *Bassia tetragona*. In 1897 CHUN uses *Bassia* in parenthesis and writes now about *Abyla (Bassia) perforata* Ggbr. He finds his specimens identical with the Atlantic *Abyla perforata* Ggbr. **60**, *Bassia perforata* Ch. **88**, and *Bassia obeliscus* Haeck. **88b**.

He hopes that further investigators will find out whether the *Abylids* described by QUOY and GAIMARD **27**, BLAINVILLE **30**, LESSON **43**, HUXLEY **59**, are identical with the specimens of the atlantic ocean.

The material of the Siboga expedition is altogether insufficient to make any conclusion concerning either question. The preservation was very middling.

We think it sufficient to give a sketch of a complete *Abyla bassensis*, using this name for the tropical *Abyla*, in opposition with *Abyla perforata* which has hitherto been used for atlantic specimens. Concerning *Sphenoides australis*, we found not the least difference with HUXLEY's excellent description and figures. HUXLEY did not notice the development of the appendages of *Abyla bassensis* into *Sphenoides australis*. Nor have we found any early stages.

It is therefore more correct to maintain the name *Sphenoides australis*, as it was given by HUXLEY **59**.

16. *Abyla trigona* Q. et G. Pl. IV, figg. 34, 35, 36.

= *Abyla trigona* Q. et G. 27.
= *Abyla trigona* Eschsch. 29.
= *Abyla trigona* Ggbr. 60.
= *Abyla trigona* Ch. 88, 97*a*.
= *Abyla carina* Hkl. 88*b*.

Stat. 118. Lat. 1° 38′ N., Long. 124° 28.2 E. *Cat.* 93 B.B. alc. 90°/₀. One superior nectophore.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 126 D. alc. 90°/₀. One superior, one inferior nectophore; the latter badly preserved.
Stat. 213. Saleyer-anchorage and surroundings including Pulu-Pasi-Tanette near the North-point of Saleyer-island. *Cat.* 78 D. alc. 90°/₀. One inferior nectophore of ? *Abyla trigona*.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 B. formald. 4°/₀. 2 superior nectophores.
Stat. 223. Lat. 5° 44′.7 S., Long. 126° 27′.3 E. *Cat.* 31 D. alc. 90°/₀. One superior nectophore.
Stat. 224. Lat. 5° 34′ S., Long. 127° 4′ E. *Cat.* 204. formald. 4°/₀. One superior nectophore.
Stat. 276. Lat. 6° 47′.5 S., Long. 128° 40′.5 E. *Cat.* 138 D. alc. 90°/₀. One superior nectophore.

Amphiroa Les.

17. *Amphiroa alata* Les. Pl. IV, figg. 37*a*, 37*b*, 38.

= *Amphiroa alata* Les. 07.
= *Amphiroa alata* Huxl. 59.
= *Eudoxia trigonae* Ggbr. 60.
= *Amphiroa alata* Ch. 88.
= *Amphiroa carina* Hkl. 88*b*.
= *Amphiroa alata* Ch. 97*a*.

Stat. 66. Bank between islands of Bahuluwang and Tambolungan, South of Saleyer. *Cat.* 140 D. alc. 90°/₀. 3 incomplete specimens.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 R. formald. 4°/₀. One specimen.

Stat. 118. Lat. 1° 38 N., Long. 124° 28'.3 E. *Cat.* 157 D. formald. 4°/₀. One specimen.

Stat. 136. Ternate-anchorage. *Cat.* 67 B.E. alc. 90°/₀. 2 badly preserved specimens.

Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 S. *Cat.* 160 D. formald. 4°/₀. One complete, one loose gonocalyx.

Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 148 B.B. alc. 90°/₀. One specimen.

Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 D. formald. 4°/₀. One specimen.

Stat. 189[a]. Lat. 2° 22' S., Long. 126° 46' E. *Cat.* 65 D.K. formald. 4°/₀. 2 gonocalyces and *Cat.* 127 F.E. alc. 90°/₀. One specimen.

Stat. 194—197. (194 = Lat. 1° 53'.5 S., Long. 126° 39' E. 195 = Lat. 1° 55' S., Long. 126° 50'.7 E. 196 = Lat. 1° 52'.8 S., Long. 127° 6' E. 197 = Lat. 1° 45'.3 S., Long. 127° 8'.3 E.). *Cat.* 75 B.C. alc. 90°/₀. One specimen.

Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 173 C.A. formald. 4°/₀. One complete specimen, a loose ♂ and a loose ♀ gonocalyx.

Stat. 215[a]. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 E. alc. 90°/₀. One specimen.

Stat. 217. Lat. 6° 40'.6 S., Long. 123° 14'.7 E. *Cat.* 168 C. formald. 4°/₀. One specimen and a loose ♂ gonocalyx.

Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 C. formald. 4°/₀. 2 specimens.

Stat. 245. Lat. 4° 16'.5 S., Long. 130° 15'.8 E. *Cat.* 143 D. alc. 90°/₀. 3 specimens.

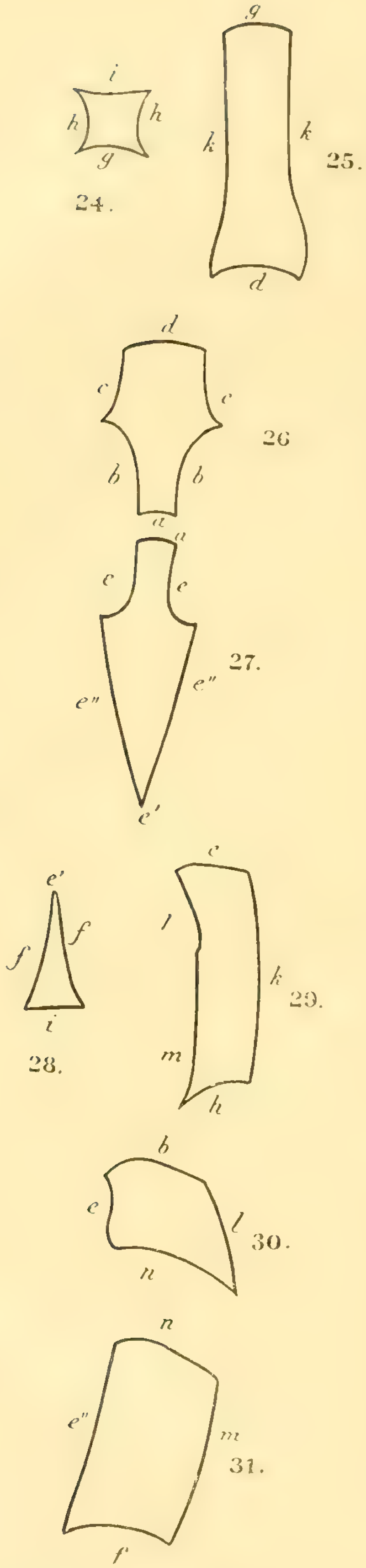
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 138 E. alc. 90°/₀. One specimen.

Abyla trigona. We want to give a detailed description of the superior nectophore as it will be of much use for understanding the structure of the same in our *Abyla Haeckeli.* To begin we give a short list of the measures in the different specimens.

	Length	Breadth
Stat. 118. Cat. 93 B.B.	$5^3/_4$ mm.	4 mm.
Stat. 203. Cat. 126 D.	5 mm.	5 mm.
Stat. 220. Cat. 77 B.	$3^1/_4$ mm.	3 mm.
Stat. 220. Cat. 77 B.	$4^1/_2$ mm.	4 mm.
Stat. 223. Cat. 31 D.	6 mm.	5 mm.
Stat. 224. Cat. 204	11 mm.	10 mm.
Stat. 276. Cat. 138 D.	4 mm.	$3^1/_2$ mm.

The superior nectophore of *Abyla trigona* is of a bilateral symmetrical structure; it is composed of 4 odd (A, CI, D, E) and three paired facets (F, F', G, G', H, H').

We begin with the former and we take as first facet the one situated at the base of the nectosac, facet A; it forms a facet around its basal opening (textfigure 24). It is surrounded by the ridges, *i*, *h*, *h*, *g*. The ridge *i* is situated on the most proximal side. Opposite is ridge *g* which belongs at the same time to the following facet E (textfig. 25). This facet is the most proximal of all and is situated above the nectosac; it has an elongated four-sided shape; the ridges are a little concave (*d*, *k*, *k*, *g*). The ridge *d* of this facet is at the same time the ventral ridge of the following facet D (textfig. 26). This ridge is an irregular hexagon (*d*, *c*, *c*, *b*, *b*, *a*). It is situated above the apex of nectosac and hydroecial canal. Apically is ridge *a* the superior point of the nectophore and the basal ridge of facet CI.



Figg. 24—31. *Abyla trigona* Q. et G. Facets of the superior nectophore. Fig. 24: facet A, Fig. 25: facet E, Fig. 26: facet D, Fig. 27: facet CI. Fig. 28: Aperture of the hydroecial cavity B, Fig. 29: facet F (F'), Fig. 30: facet G (G'), Fig. 31: facet H (H'). Figg. 24—31: × 6.

This CI is an irregular pentagon (textfig. 27 *a*, *c*, *c*, *c''*, *e''* its point *c*). This facet is bent, the curve being about the middle between ridge *e* and *e''*. It is situated nearly above the hydroecial cavity and the somatocyst and constitutes the hind facet of the superior nectophore. Between facet CI and A is the hydroecial cavity, which for convenience's sake will be called B (textfig. 28). This cavity is bounded by the inferior ridge of the paired facets (ridges *f*, *f'*) and by one of the ridges of facet A, that is to say ridge *i*. These are the odd facets. The paired ones are three in number, F, F', G, G', H, H'. F and F' (textfig. 29) are rhomboids, they are in connection with facet E through ridge *k*, apically with facet D through ridge *c*, with facets G and G' through ridge *l*, with facets H and H' through *m*, with facet A through ridge *h*. These facets are situated on the lateral sides of the nectosac and cover a part of the hydroecial cavity.

Facets G and G' (textfig. 30) are much smaller, small trapezoids and consist of four ridges. They are connected with facets F and F' through ridge *l*, through ridge *b* with facet D, through ridge *e''* with facet CI, through ridge *n* with facets H and H'. They overlap partly both somatocyst and hydroecium. Facets H and H' (textfig. 31) are bounded by ridge *n* to the facets G and G', through ridge *m* to facets F and F', through ridge *e''* to facet CI while its basis constitutes the limit of the hydroecial cavity B.

All these facets are to be found in the same order in all the superior nectophores of *Abyla trigona* which were brought home by the Siboga.

In all nectophores the stem with appendages was either lost or very badly preserved. Also in this respect the material of the Siboga proves to be far complete.

As to the history of *Abyla trigona* we thought it necessary to note the following. Quoy and Gaimard described **27** a new genus *Abyla* with the species *trigona*. Their description is unsufficient. They speak of "un corps très irrégulier, taillé à facettes, "plus long que large" etc. speaking of the superior nectophore but they give no further details concerning the position of these facets. Their sketches too are not quite clear.

We had the occasion, thanks to the kindness of Prof. Edmond Perrier, to examine all the material of *Siphonophores*, which forms part of the Musée d'Histoire Naturelle in Paris. We saw some

of the original *Siphonophores* of QUOY and GAIMARD's expedition and amongst others we found the very specimen described as *Abyla trigona*. In all respects the *Abyla trigona* of ESCHSCHOLTZ **29**, GEGENBAUR **60**, CHUN **88**, **97a** and HAECKEL **88b** and also ours are identical with the type specimens.

GEGENBAUR **60** finds his specimens in the atlantic ocean but also "aus den westindischen "Gewässern und einige auch aus dem indischen Meere" (**60** p. 338).

We would like to copy the description he gives of the superior nectophore of *Abyla trigona* and add the letters we used for the different facets, so as to show clearly the absolute identity of his specimens and ours (**60** p. 338).

"Beginnen wir die Betrachtung der Begrenzungsflächen von jener aus, welche dicht oder "wenn man sich die beiden Schimmstücke liegend und die Mündung des vorderen Schwimm-"stücks nach oben und hinten gerichtet denkt, über dem Schwimmsack liegt, so finden wir dies "ein schmales langgezogenes Viereck (E) vorstellend, welches unten in zwei kurze die Mündung "der Schwimmhöhle überragende Zacken ziemlich stark ausläuft. . . . . Die Oberfläche zeigt eine "sechsseitige, an manchen Exemplaren sanft vertiefte Facette (D), die nach vorn aufsteigt und "in eine meist etwas vorstehende Kante ausläuft. . . . . Die sechste, vordere Facette, die Firste "des ganzen Schwimmstücks bildende kommt dadurch zu Stande, dass hier die vordere Seite "des Schwimmstücks eine von der Firste an beginnende und zum Teile noch die obere Begren-"zung mitbildende, dann aber in sanfter Biegung nach abwärts tretende Fläche (CI) besitzt, "statt der bei *A. pentagona* befindlichen scharfen Kante. Die obenerwähnte vordere Fläche (CI) "wölbt sich sanft nach vorne zu und läuft fast parallel mit der viereckigen Fläche der andern "schmalen Seite nach abwärts, wo sie immer schmäler werdend in einer zuweilen hackenförmig "gekrümmten Spitze endet. Auf beiden breiten Seiten lässt das vordere Schwimmstück dann "noch drei Facetten erkennen; erstlich eine trapezförmige kleinere (G, G′), welche an die beiden "oberen Begrenzungsflächen stösst, dann zwei grosse, die durch eine der Länge nach verlaufende "fein gezähnelte Kante von einander geschieden sind (F, F′, H, H′). An der unteren Fläche "befindet sich in der Mitte eine grosse, fast das ganze Stück bis zur Wölbung durchsetzende "vierseitige Höhlung (A) deren Eingang hinten von zwei etwas nach aussen gekrümmten "Zackenfortsätzen begrenzt wird".

HAECKEL's specimens have been captured near the Canary-islands Lanserote. He calls them *Abyla carina* but gives no reason at all why he should think his specimens different from *Abyla trigona* Q. et G. We could not find any differences. We copy also part of HAECKEL's work (**88b** p. 157) concerning the shape of the superior nectophore. "The six lateral faces are "two odd and four paired. The dorsal odd face (E) covers the nectosac and is nearly rectangular, "twice as long as broad, its superior edge a little longer than the inferior. The opposite ventral "odd face, covering the somatocyst is smaller, isosceles triangular, three times as long as broad; "the apex of the triangle is directed downwards, the two lateral edges are convex (CI). The "two-paired ventro-lateral faces are quadrangular (H, H′) their dorsal edge longer than the "parallel ventral, and the straight superior edge smaller than the concave inferior. The two "paired dorso-lateral faces cover the lateral sides of the nectosac and are hexagonal; their two "parallel edges are two to three times as long as each of the two superior or the two inferior

"edges (F, F'). The apical or superior face of the hexagonal prism is not a simple face but "divided by a proximal transverse frontal crest into two unequal apical facets, a dorsal and a "ventral. The dorsal apical facet (D) is far larger and covers the apex of the nectosac; it is "hexagonal with two odd and four paired edges, the odd dorsal and ventral edges are parallel "and of equal length; they are longer than the two ventral lateral and smaller than the two "dorsal lateral, deeply emarginated edges. The ventral apical facet (CI) is quadrangular, much "smaller and covers the top of the somatocyst. Its two lateral edges are twice as long as the "inferior and superior edge and are so deeply emarginated that the facet appears to be nearly "bisected by a frontal constriction. The basal face of the hexagonal prism is also divided by a "prominent transverse frontal crest into two unequal basal facets, a dorsal and a ventral. The "dorsal basal facet (A) is square, and contains the opening of the nectosac, the ventral basal "facet (B) containts the opening of the hydroecium and is isosceles triangular; the apex of the "triangle is directed ventrally and meets with the apex of the triangular ventral face" [1]).

HAECKEL speaks about the deep emargination and the approximate bisection shows that he does not really find the division into two as we will see in *Abyla Haeckeli.*

Amphiroa alata. Pl. IV, figg. 37*a*, 37*b*, 38.

HAECKEL **88** b proposes to call the *eudoxids* of *Abyla trigona* described by GEGENBAUR for atlantic specimens *Amphiroa trigona,* because the original type described by LESUEUR **27** was found also in the atlantic ocean. The *eudoxids* of HUXLEY's specimens, captured in the Tropical Pacific and the Indian ocean, should be called *Amphiroa alata*; they are as HAECKEL supposes, the *eudoxids* of *Abyla alata* Hkl., the name he proposed for HUXLEY's specimens, which he thinks different from *Abyla trigona* Q. et G. But now HAECKEL forgets that GEGENBAUR found some specimens not only in the atlantic ocean but also "an der Guineaküste und in den "westindischen Gewässern (**60** p. 339)".

CHUN seems to have overlooked the identity between the *Eudoxia trigonae* of GEGENBAUR, and the *eudoxids* described by HUXLEY. He hopes that further investigations will bring some light (**97** a p. 32). We have looked in vain for any differences with atlantic specimens. But preserved material is never perfect and as the incompleteness was very great as far as the gonocalyces are concerned, we can give no more elaborate description, but a few sketches may perhaps suffice (Pl. IV, figg. 37*a*, 37*b*, 38).

18. *Abyla Haeckeli* nov. spec. Pl. V, figg. 39, 40, 41.

= *Abyla trigona* Huxl. 59.
= *Abyla alata* Hkl. 88.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 P. formald. 4°/₀. 2 superior nectophores.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 126 F. alc. 90°/₀. One superior nectophore.
Stat. 215ᵃ. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 C. alc. 90°/₀. one superior nectophore.

1) It should be borne in mind that HAECKEL in this case (p. 15) applies the name "face" to what is in reality a cavity.

The measures of the superior nectophores are:

	Length	Breadth
Stat. 106. Cat. 91 P.	6 mm.	7 mm.
Stat. 106. Cat. 91 P.	4 mm.	3 mm.
Stat. 203. Cat. 126 F. . . .	6 mm.	$5^1/_2$ mm.
Stat. 215[a]. Cat. 128 C. . . .	5 mm.	$5^1/_2$ mm.

The real difference which exists between *Abyla trigona* and *Abyla Haeckeli* is the presence of one more facet in the superior nectophore. The facet CI is divided into two parts by a new ridge. The deep emargination of the facet, as HAECKEL calls it, has thus changed into an actual division by the addition of a new ridge. In consequence of this the aspect of the superior nectophore changes entirely.

The odd facets are six in number. Facet A (textfig. 32), D (textfig. 34), E (textfig. 33) are identical with the same facets in *Abyla trigona*, so we need not give any further description of them.

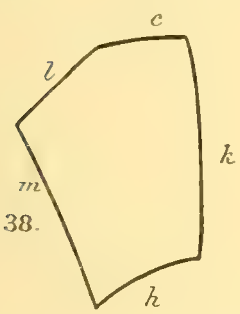
But facet CI (textfig. 36) has become a distinct pentagon with the ridges *p*, *o*, *o*, *e''*, *e''*. This facet is the inferior part of the facet CI in *Abyla trigona*. The upper part facet CII (textfig. 35) consist of the ridges *a*, *e*, *e*, *p* and is a quadrangle.

The paired facets change in shape. G and G' (textfig. 39) consist of the ridges *o* (of facet CI), *e* (of facet CII), *b* (of facet D), *l* (of facets F and F').

The point of *e* (the junction of *e''* and *e''*) does not form directly the limit of the hydroecial cavity. There is yet a very small ridge *g* to be found. This is the only difference for the facets H and H'.

In addition to this we found that in some superior nectophores the ridges were concave, and the edges where they meet very acute (Cat. 128 C). So we find some resemblance with HUXLEY's figures of his *Abyla trigona*.

This is yet more clear when we copy HUXLEY's description of the superior nectophore (**59** p. 82). "The proximal nectocalyx has six faces arranged "around the inferior moiety of its longitudinal axis. "Of these the anterior is an oblong parallellogram "(E) with its inferior angles produced and a little "divergent; the posterior is triangular (CI) with its apex downwards; the

38.


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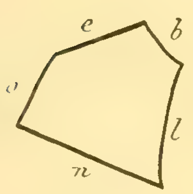

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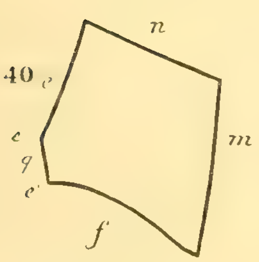
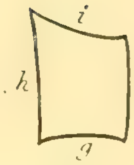
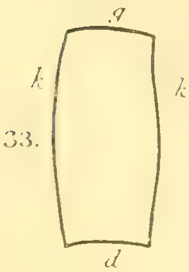
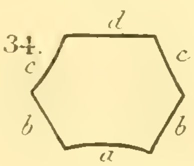
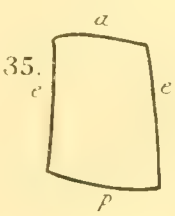


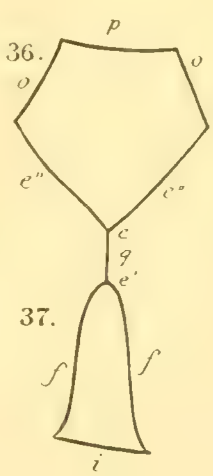
Figg. 38—40.
Abyla Haeckeli nov. spec.
The paired facets of the superior nectophore.
Fig. 38: facet F (F'),
Fig. 39: facet G (G'),
Fig. 40: facet H (H').
Figg. 38—40: $\times$ 6.

32.


33.


34.


35.


36.
37.


Figg. 32—37.
Abyla Haeckeli nov. sp.
The odd facets of the superior nectophore.
Fig. 32: facet A,
Fig. 33: facet E,
Fig. 34: facet D,
Fig. 35: facet CII,
Fig. 36: facet CI,
Fig. 37: Aperture of the hydroecial cavity B.
Figg. 32—37: $\times$ 6.

"antero-lateral faces are pentagonal (F, F′) the postero-lateral rhomboidal (H, H′). The superior "extremity of the proximal is cut into four facets; an anterior, hexagonal with concave lateral "edges (D); a posterior, quadrilateral meeting the last in a transverse ridge (CII) and two "lateral rhombic faces which fit in between the anterior and posterior facets of the superior "surface above and between the antero-lateral and postero-lateral below (G, G′).

"The interior face presents an anterior quadrilateral facet (A) in the midst of which is "a small aperture of the nectosac, surrounded by a five-toothed raised margin. Posteriorly the "interior face slopes very obliquely upwards and backwards and presents a triangular space "entirely occupied by the aperture of the hydroecium (B)".

Huxley found his single specimen in Torres Straits off the South-east coast of New-Guinea. So we have sufficient reason to believe our specimen to be identical with it. As inferior nectophores, stem and appendages failed entirely we hope that other investigators may fill up this void.

The name *Abyla alata* Hkl. is to our opinion not a good one as the eudoxids of *Abyla trigona* are called thus and we do not know after all if the eudoxids of *Abyla trigona* and *Abyla Haeckeli* are similar.

We would have liked to call these specimens *Abyla Huxleyi*, as Huxley after all found these for the first time. But this name has already been used by A. Agassiz and A. G. Mayer **1902** (see *Abyla pentagona* p. 25).

19. *Abyla Leuckarti* Huxl. Pl. V, figg. 42, 43, 44, 45, 46.

= *Abyla Leuckartii* Huxl. 59.
= *Abyla Leuckartii* Huxl., A. Agass. and A. G. Mayer 1902.

Stat. 136. Ternate-anchorage. *Cat.* 80 E. formald. 4°/₀. 2 superior nectophores and *Cat.* 67 B.B. alc. 90°/₀. One superior nectophore.
Stat. 143. Lat. 1° 4′.5 S., Long. 127° 52′.6 E. *Cat.* 86 C. alc. 90°/₀. One superior nectophore.
Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 59 F. alc. 90°/₀. One superior nectophore.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 126 D. alc. 90°/₀. 2 superior nectophores.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 B. formald. 4°/₀. One superior nectophore.

The measures of the eight specimens of *Abyla Leuckarti* Huxl. are:

	Length	Breadth
Stat. 136. Cat. 80 E.	$6^1/_4$ mm.	4 mm.
Stat. 136. Cat. 80 E.	$6^1/_4$ mm.	4 mm.
Stat. 136. Cat. 67 B.B.	6 mm.	3 mm.
Stat. 143. Cat. 86 C.	$6^3/_4$ mm.	$3^3/_4$ mm.
Stat. 148. Cat. 59 F.	7 mm.	4 mm.
Stat. 203. Cat. 126 D.	$6^1/_2$ mm.	$3^3/_4$ mm.
Stat. 203. Cat. 126 D.	$5^1/_4$ mm.	3 mm.
Stat. 220. Cat. 77 B.	4 mm.	2 mm.

The only investigators who have found this interesting *Abyla Leuckarti* are Huxley and A. Agassiz and A. G. Mayer.

Huxley's specimens had a length of $7^1/_2$ mm., a breadth of 4 mm., A. Agassiz and A. G. Mayer give the very considerable dimension of 22 mm. in length. Neither of them give a distinct description of the shape of the facets.

We begin with facet A (textfig. 41) the same facet in *Abyla trigona* and *A. Haeckeli* which surrounds the aperture of the nectosac. It consists of the ridges *i*, *h*, *h*, *g*.

Ridge *g* belongs to facet E (textfig. 42) as in *Abyla trigona* and *A. Haeckeli*. The other ridges of facet E are again ridges *k*, *k* and *d*.

Ridge *d* is the superior one of a complex of facets which we might identify with D, CII and CI of our *A. Haeckeli* (textfig. 43).

Then the side-ridge *r* would consist of $c + b + e + o + e''$. The ridges *a* and *p* have quite disappeared. Near the point where in *A. Haeckeli* we find ridge *p*, the ridges form together the posterior side of the nectophore, whilst ridge *b* and *c* are situated on the top of the nectophore.

Finally there is yet the hydroecial aperture B (textfig. 44) which is three-sided (ridges *f*, *f*, *i*).

In the paired facets we could think again of the conjunction of some facets; *f*, *i* of F, G, H and F′, G′, H′ together (textfig. 45).

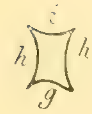
The superior lateral ridge is ridge *r* and posteriorly ridge *f* which belongs to the hydroecium. Anteriorly we find ridge *k* of facet E, on the basal side ridge *h* of facet A. Between ridge *k* and *r* is the posterior side of yet another ridge *s* which ends quite suddenly, a little before touching the point of ridge *h*. This abrupt cessation of the ridge could be found clearly in all eight superior nectophores. This ridge might be the same as f. i. ridges *l* and *m* in *Abyla trigona*. Ridge *n* has apparently disappeared.

As the superior nectophore is ever so much longer than broad, somatocyst, nectosac and hydroecium are also elongated. The somatocyst is broadest under ridge *s* (Pl. V, fig. 44 *som.*); in the dorsal wall it possesses very big glandular cells. In the apex it gives off a small canal to the stem.

The nectosac (Pl. V, fig. 44 *n.sac*) has an elongated, cylindrical tube-shape; a short, thread-like canal goes off from the stem to the apex of the nectosac, divides itself into four canals, whose course is a lateral one; they all end in a circular canal, each of them yet showing a small enlargement.

Of stem and appendages we can tell no more than Huxley and Agassiz and Mayer could. We found some siphons with clustered tentacle and tentilla and groups of young appendages, but we could not find any group sufficiently developed to give an idea of the shape of the future *Eudoxid*.

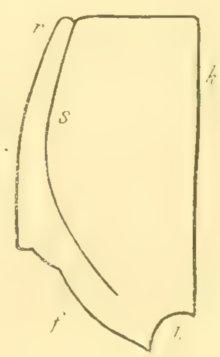
As is said above there were no loose inferior nectophores.

41.


42.


43.


44.


45.


Figg. 41—45. *Abyla Leuckarti* Huxl. The facets of the superior nectophore. Fig. 41: facet A, Fig. 42: facet E. Fig. 43: facets D, CII, CI combined, Fig. 44: Aperture of the hydroecial cavity B. Fig. 45: facets F, G, H, (F′, G′, H′) combined. Figg. 41—45: × 5.

Subfam. Diphyabylinae nobis.

Diphyabyla nobis.

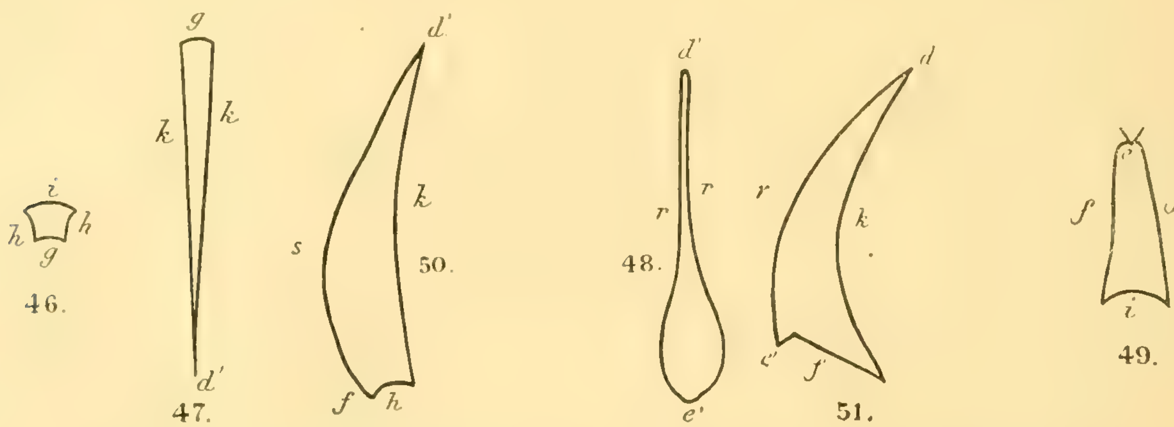
20. *Diphyabyla Hubrechti* nov. gen. nov. spec. Pl. VI, Fig. 47.

Stat. 42. Lat. 7° 20'.7 S., Long. 117° 58'.3 E. *Cat.* 118. alc. 90°/₀. fixation in Cu SO_4, then chromacid 1°/₀. One superior nectophore.

Through the fixation in Cu SO_4, then chromacid, this unique specimen of an entirely new genus has probably preserved much of its original shape. The colour of course is much altered but the ridges stand out very clearly, they are of a brownish colour and show markedly against the greenish gelatinous substance.

The *Diphyabyla* resembles *Diphyes* concerning its top, *Abyla* with respect to its base, which has induced us to propose a name which is a combination of that of the two genera.

Again we will use the ridges and their letters as we used them for *Abyla Leuckarti*, *Abyla Haeckeli* and *Abyla trigona*.



Figg. 46—51. *Diphyabyla Hubrechti* nov. gen. nov. spec. The facets of the superior nectophore. Fig. 46: facet A, Fig. 47: facet E, Fig. 48: facet D, CII, CI combined, Fig. 49: aperture of the hydroecial cavity B, Fig. 50: facets F (F'), Fig. 51: facets G + H (G' + H') combined. Figg. 46—51: 2 ×.

We tried to make a comparison between the former and our new specimen. It is especially *Abyla Leuckarti* which is of the greatest importance.

We suppose ridges *k*, *k*, *s*, *s* and the lateral side of ridge *r* of *Abyla Leuckarti* (see textfig. 45) to have continued upwards; ridge *s* has moreover gone as far as the point where it meets ridge *h* at an acute angle.

In the apex of the nectophore these ridges *k*, *k*, *s*, *s*, *r* grow convergent. Ridges *s* and *r* on both sides meet near the top and go on as one single ridge to the apex, so that we count there four ridges, being *k*, *k*, *s* + *r* and *s* + *r*.

The facets are situated as follows: Around the opening of the nectosac we distinguish again the usual facet A (textfig. 46) whose proximal ridge *g* is only half as long as the opposite ridge *i*.

The course of ridges *h*, *h* is a concave one. Ridge *i* is at the same time one of the limits of the hydroecial cavity B (textfig. 49). This cavity has very strong muscular walls; the other ridges around this cavity are *f*, *f*. These meet together in the point *e′* but this is not clearly to be seen as the next facet, the most ventral one has two ridges which overlap this point (Pl. VI, fig. 47). The length of the hydroecial cavity measured from point *e′* to ridge *i* measures 8 mm.

The combinationfacets D + CII + CI (textfig. 48) are club-shaped. We suppose that this complex of facets is the same as in *Abyla Leuckarti.*

The ridges are feebly serrated at the top but this gradually increases; near the point *e′* there are very clearly marked teeth.

This combinationfacet is largest on the level of the somatocyst (4 mm.) and then narrows suddenly; the ridges continue on each side; they meet at the top; their whole length is $21^1/_2$ mm. They meet in the point *d′*.

Nearly $9^1/_2$ mm. from point *e′* the combinationfacet D + CII + CI shows an identation, which appears also on the other surrounding facets. It seems as if the *Diphyid*-like upper part had been put on the *Abylid*-like lower part of the nectophore (Pl. VI, fig. 47*a*) and that they had not yet quite grown together. When we draw a line parallel to the side ridges of the facet D + CII + CI and one in the same direction with the side ridges of the facet E which we will describe later, these two lines meet each other at an angle of about 20°.

Facet E (textfig. 47) is quite easily recognizable. It is situated on the proximal side; immediately underneath is the nectosac (Pl. VI, fig. 47). The side ridges (*k*, *k*) have a length of 24 mm. (measured from *d′* to ridge *g* of facet A); the distance between point *d′* and the curved part is $8^1/_2$ mm. The ridges *k*, *k* show a little serrating at the top and this gets more marked near the base; it resembles the dentition near point *e′*. The greatest breadth of facet E is near ridge *g*. There it measures $2^1/_2$ mm.

In *Abyla Leuckarti* Huxl. we found three odd facets and the opening of the hydroecium. This same number we find back in *Diphyabyla Hubrechti.* The paired facets are two in number; they too can be compared to the same facets in *Abyla Leuckarti.*

In the latter we spoke of the complex facets F + G + H (F′ + G′ + H′) because ridge *s* did not continue to meet ridge *h*. This happens in *Diphyabyla.*

So here we get again the usual facet F (resp. F′ textfig. 49) and the combination facet G + H (resp. G′ + H′).

This combinationfacet G + H (textfig. 50) consists of four ridges. From point *e′* the ridge *r* goes off which is the combination of *e′* + *o* + *e* of *Abyla Leuckarti* Huxl. This ridge continues straight upwards but before attaining the top ($4^1/_2$ mm. below it) it is joined by ridge *s* of the other side. Basally is the ridge *f* of the hydroecial cavity.

Ridge *s* begins $1^1/_2$ mm. before the angle where ridge *h* and line *f* meet. It consists of the combination of ridges *l* and *m*. It is a little serrated, hardly prominent and has a total length of $23^1/_2$ mm. ($15^1/_2$ mm. from its base to the curved part) and has its course right over the median part of the hydroecial cavity. (Pl. VI, fig. 47).

Facet F and facet F′ consist of the ridges *s*, *f*, *h*, *k* of which ridge *k* meets *s* at the top near point *d′*.

Somatocyst (Pl. VI, fig. 47 *som.*).

The somatocyst has a length of $4^1/_2$ mm., a breadth of 3 mm. It is situated partly underneath the ridges lateral of the complex facet D + CII + CI. It is of a splendid retort-shape and shows a wall with an irregular network of cells. These are not so well preserved as in *Abyla Leuckarti.* Near the upper part of the posterior side one small canal branches off which goes to the hydroecium and from there probably to the nectosac.

The hydroecium is a three-sided cavity, lined by the ridges *f*, *f* (point *e′*) and *i*. Point *e′* is overhanging the walls of this cavity and these gradually disappear underneath this projecting point. The length of this very big hydroecial cavity is on the nectosac-side 8 mm., on the somatocyst-side 5 mm.

Of stem and appendages little is to be said as we had to leave this unique specimen of a new genus absolutely intact.

By the reflection of direct sunlight on the mirror of the microscope we were able to lighten up the interior of the hydroecium. Then we saw quite clearly, two mature siphons, two young undeveloped siphons, an undistinguishable cluster, probably a cluster of tentilla and a young bract.

The largest siphon was 3 mm. long, 1 mm. broad, distinctly divided into a stomach and a basigaster.

The bract, assumes, as far as we can see, a leaf-like shape, such as some *Physophorid*-bracts show. (fig. 47 *br.*). It is not mature, as it shows yet various conglomerations of cells on the surface; the canal of the bract is very broad, which also shows the relative age of this bract. On one side the ridge is very sharply serrated. On the whole the bract has not a *Calycophorid*-like appearance.

The nectosac measures 19 mm. from its aperture to the curved part of the nectophore; from there to the top *d′* it measures about 10 mm. It is broadest at its base (2 mm.) this continues to the level of the somatocyst; then it diminishes gradually. From some way beneath the curved part, its wall is very much damaged going upwards but it is clear and well-preserved again near its apex. The apex of the nectosac lies 3 mm. downward from point *d′*.

So the nectosac is really the only interior part which is *Diphyid*-like.

We spoke about the canal which runs along the top of the hydroecium. It continues its course proximally upwards and divides itself, when it has arrived in the middle of the nectosac into probably four canals. Two of these go immediately to the lateral walls of the nectosac, they go on proximally and end below on the side of facet E.

Another canal follows probably the hindwall of the nectosac, but it is nearly invisible, especially as the wall near the curved point is nearly destroyed. But we suppose there might be one, as at the top of the nectosac there is an agglomeration of substance (? pigment) as is found in *Diphyids* and *Monophyids* and traces of the canal going upwards and downwards (f. i. *Diphyopsis campanulifera* Q. et G.). There is probably also a dorsal canal. We could not find out whether these canals are in connection with one another at the base through a ring-canal.

Resuming we find that *Diphyabyla Hubrechti* resembles *Abyla Leuckarti* in four points:
1^0 by the shape of the somatocyst,
2^0 by the shape of the hydroecium,
3^0 by the course of the canal which goes to the nectosac,
4^0 by the general appearance of the basal part of the nectophore.

It resembles *Diphyopsinae*:
1^0 by the upper part of the nectophore, as concerns the ridges,
2^0 by the shape of the nectosac.

Finally the shape of the immature bract is *Physophorid*-like.

Subfam. Diphyopsinae Hkl. 88*a* and 88*b*.

Some of the following different species of *Diphyopsinae* bear two names: *Diphyes* and *Diphyopsis* because by the effects of the conservation the stem had in many cases contracted itself and lost many of its appendages. It was then in most cases impossible to make out whether there were any special nectophores in the groups of appendages ("Specialschwimmglocken"), the characteristic peculiarity which distinguishes Haeckel's genus *Diphyopsis*.

So we begin be describing the species which decidedly do not show any sign of this development; they are *Diphyes contorta* nov. spec., *Diphyes dispar* Cham. Eys., *Diphyes Nierstraszi* nov. spec., *Diphyes indica* nov. spec.

Then we describe three species which resemble *Diphyes*, but of which we could not definitely say whether there are special nectophores. Finally we describe four true *Diphyopsis*.

Unfortunately all inferior nectophores (excepting *Diphyopsis campanulifera*) were lost. Of course there were many loose inferior nectophores of *Diphyopsinae* in the Siboga material, but only for two specimens, there was no question of determination. We suppose that the inferior nectophores do not keep as well in the preserving fluid and are even more delicate than the superior ones. This we have seen in some complete specimens, where the inferior nectophore was quite crumpled up, the superior one tolerably well preserved (Cat. 50 C.B. (2) *Diphyes* (? *Diphyopsis*) *Gegenbauri* nov. sp.).

Diphyes Cuvier.

21. *Diphyes contorta* nov. spec. Pl. VI, figg. 48, 49, 50.

Stat. 35. Lat. 8° 0'.3 S., Long. 116° 59' E. *Cat.* 85. alc. 90°/₀. 3 specimens.
Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.E. formald. 4°/₀. 2 specimens.
Stat. 66. Bank between islands of Bahuluwang and Tambolungan, South of Saleyer. *Cat.* 140 E. alc. 90°/₀. 16 specimens.
Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 E. alc. 90°/₀. 5 specimens.
Stat. 96. South-east side of Pearl-Bank, Sulu-archipelago. *Cat.* 99 B. alc. 90°/₀. 4 specimens.
Stat. 99. Lat. 6° 7'.5 N., Long. 120° 26' E. Anchorage off North Ubian. *Cat.* 70 B. alc. 90°/₀. One specimen.

Stat. 106. Anchorage off Pulu Tongkil, Sulu-archipelago. *Cat.* 91 J. formald. 4°/o. One specimen.
Stat. 110. Lat. 4° 34' N., Long. 122° 0' E. *Cat.* 47 A. formald. 4°/o. 22 specimens.
Stat. 117a. Lat. 1° 15' N., Long. 123° 37' E. *Cat.* 119 C. formald. 4°/o. 3 specimens and *Cat.* 137 B. alc. 90°/o. One specimen.
Stat. 118. Lat. 1° 38' N., Long. 124° 28'.2 E. *Cat.* 93 B.A. alc. 90°/o. 5 specimens.
Stat. 122. Lat. 1° 58'.5 N., Long. 125° 0'.5 E. *Cat.* 73 A. formald. 4°/o. One specimen.
Stat. 125. Anchorage off Sawan, Siau-island. *Cat.* 36 A. alc. 90°/o. 2 specimens.
Stat. 136. Ternate-anchorage. *Cat.* 80 J. formald. 4°/o. 8 specimens and *Cat.* 67 B.D. alc. 90°/o. 2 specimens.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 A. formald. 4°/o. 2 specimens and *Cat.* 92 A. alc. 90°/o. 2 specimens.
Stat. 143. Lat. 1° 4'.5 S., Long. 127° 52'.6 E. *Cat.* 86 A. alc. 90°/o. One specimen.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 C. formald. 4°/o. 22 specimens.
Stat. 146. Lat. 0° 36' S., Long. 128° 32'.7 E. *Cat.* 33 B.A. alc. 90°/o. 2 specimens.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 59 D. alc. 90°/o. One specimen.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 H. formald. 4°/o. One specimen.
Stat. 168. Anchorage North of Sabuda-islands. *Cat.* 97 B. formald. 4°/o. 2 specimens.
Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 B. formald. 4°/o. 22 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 A. formald. 4°/o. 5 specimens.
Stat. 174. Waru-bay, North-coast of Ceram. *Cat.* 35 B. alc. 90°/o. 24 specimens.
Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-islands. *Cat.* 142 C. alc. 90°/o. 2 specimens.
Stat. 185. Lat. 3° 20' S., Long. 127° 22'.9 E. *Cat.* 100 A. formald. 4°/o. 3 specimens.
Stat. 186. Lat. 3° 20' S., Long. 127° 20'.5 E. North side of Manipa-strait. *Cat.* 25 V.E. formald. 4°/o. 2 specimens.
Stat. 189a. Lat. 2° 22' S., Long. 126° 46 E. *Cat.* 65 D.C. formald. 4°/o. One specimen and *Cat.* 127 F.F. alc. 90°/o. 5 specimens.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 39' E. *Cat.* 23 A.A. formald. 4°/o. 3 specimens.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 126 C. alc. 90°/o. One specimen.
Stat. 213. Saleyer-anchorage and surroundings including Pulu-Pasi-Tanette, near the North-point of Saleyer-islands. *Cat.* 78 E. alc. 90°/o. One specimen.
Stat. 215a. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 A. alc. 90°/o. 11 specimens.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 A. formald. 4°/o. 24 specimens and *Cat.* 144 B. alc. 90°/o. 28 specimens.
Stat. 223. Lat. 5° 44'.7 S., Long. 126° 27'.3 E. *Cat.* 31 C.A. alc. 90°/o. 8 specimens.
Stat. 225. 5700 M. N., 279° E. from South point of South Lucipara-island. *Cat.* 45 B. alc. 90°/o. 8 specimens.
Stat. 245. Lat. 4° 16'.5 S., Long. 130° 15'.8 E. *Cat.* 143 A. alc. 90°/o. 38 specimens.
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 138 F. alc. 90°/o. 9 specimens.

This new species of *Diphyids* was represented by 302 specimens. It is characterized by the absolute contortion of the somatocyst and the facet to which it belongs. There were only superior nectophores, as all loose inferior of *Diphyids* were very badly preserved and we could not possibly make out the place that should be allotted to them in the system.

These superior nectophores are all comparatively small, measuring from 4—8 mm., the breadth from 2—3 mm. taken at the base along the aperture of the nectosac. They are tolerably well preserved. (Pl. VI, fig. 48).

Seen from the dorsal side, with the nectosac clearly proximal, we see a most beautiful oval-shaped facet (A) with two lateral serrated ridges whose course shows a very perfect convexity. These two ridges do not meet at the base, for there is yet a basal ridge, standing transversely on the oval. In the centre this ridge shows a slight rise. There we see an absolutely median ridge, which begins at the base of the facet near the velum, goes upwards, but does not finish in the apex of the oval. It looses itself quite suddenly in the gelatinous substance. This odd ridge (fig. 48*a*) is not serrated. In some specimens it disappears already in the lower half of the oval (Cat. 122 C. fig. 48) in others in the upper half (Cat. 164 H. figg. 49, 50).

The lateral convex ridges of facet A are at the same time the lateral ones of a pair of facets B, B′ (Pl. VI, figg. 49, 50 *B*) situated on the right and left side of the proximal facet A. They are much more irregular, very concave, as their gelatinous substance is overlapped a good deal by the prominent lateral ridges of facet A. They are however well-developed, their ridges begin at the top, the two posterior ones having a regular concave course. These ridges are at the same time the lateral ridges of the posterior or ventral facet. They differ however one from another. The left lateral ridge (facet B′) is clearly seen in a lateral sketch taken from the left side (Pl. VI, fig. 49) but the right lateral ridge (facet B) goes parallel with the course of the somatocyst, about which we shall speak later. The ridge B′ is therefore narrower than B especially near the apex. Basally facet B′ shows us a ridge, the limits of the hydroecial cavity. It goes on quite pointedly at the basal part of the nectosac, then goes upwards again and bends itself. Near the lateral ridges of facet A it continues into the basal one of the latter. Especially there where the ridge is produced into a sharp point it is finely serrated.

It is clear that judging from the irregularity and the position of the paired lateral facets, the odd ventral one (C) is not quite median. It is twisted, beginning at the base, and then proximally to the left (see Pl. VI, fig. 50). The lateral ridges of this facet are serrated near the basal part; the ridges continue and form the hindwall and the limits of the hydroecial cavity. Near the aperture they are very much serrated.

Interior. The nectosac has the shape such as Haeckel **88b** describes for true *Diphyes*-like specimens. In Cat. 164 H it is less well-preserved than in Cat. 122 C. It has a cylindrical shape, very broad as the anterior wall reaches nearly the front median ridge, while the posterior one is underneath half of the breadth of the paired lateral facets B and B′. The canals in the nectosac were probably absolutely invisible in consequence of imperfect conservation.

The hydroecial cavity is small (see ventral fig. 51 *hydr.*) shallow, campanulate.

The somatocyst (figg. 49, 50 *som.*) is nearly threadlike at the top of the hydroecium. This stalk-like structure widens quite suddenly into a broad, more or less club-shaped vesicle, in which there are sometimes white calcareous granules. The somatocyst is never pointed nor elongated at its top, but always blunt.

In the stem and appendages nothing particular was seen, owing also to the incomplete preservation. In some specimens the groups of appendages would have been well enough developed to show the appearance of a bud which would become a special nectophore. But this bud always failed. We have seen clearly in some specimens, the development of a gonophore but never of a special gonocalyx.

22. *Diphyes dispar* Cham. u. Eys. Pl. VI, figg. 51, 52.

= *Diphyes dispar* Cham. u. Eys. 21.
= *Diphyes angustata* Eschsch. 29.
= *Diphyes regularis* Meyen 34a.
= *Diphyes dispar* Huxl. 59.

Stat. 135. Lat. 1° 34′ N., Long. 126° 54′ E. *Cat.* 167. One superior nectophore.

Chun (**97a**) has put amongst the synonyms of *Diphyopsis campanulifera* Q. et G. **27** (with a note of interrogation) the *Biphora bipartita* found by Bory de St. Vincent **1804** and described and figured by Chamisso and Eysenhardt **21** under the name of *Diphyes dispar*.

He says p. 27 (**97a**) "Ausserordentlich nahe (to *Diphyopsis campanulifera*) steht ihr die "pacifische von Chamisso und Eysenhardt entdeckte *Diphyes dispar*. Inwieweit sie specifisch von "*D. campanulifera* verschieden ist, müssen weitere Untersuchungen lehren. Sie ist entschieden "identisch mit *Diphyes angustata* Eschscholtz".

From the descriptions of Chamisso and Eysenhardt, Eschscholtz, Meyen, Huxley, we conclude that they all found the development of a special nectophore in the groups of appendages. In that case *Diphyes dispar* should be termed *Diphyopsis dispar*.

Now the Siboga expedition captured a superior nectophore of large dimension, which shows the greatest conformity with the description of the authors we mentioned above.

The total length is about two centimeters; unfortunately the upper part is damaged and there is no clear sketch to be given.

The breadth is (measured from the posterior ridge of the nectophore at its basal part to the dorsal ridge) $1^1/_2$ cm. Evidently the specimen is relatively very broad (Pl. VI, fig. 51).

It is pyramidal and possesses 5 ridges from apex to base. All the ridges are serrated near the top, these teeth disappear gradually and show themselves again near the base. Then the serrating is quite developed again at the base of the ridges which form the anterior part of the hydroecial cavity.

The shape of the dorsal tooth and lateral teeth, the proximal ridge of the hydroecium are quite identical with the figures in Huxley's description (**59** p. 30, Pl. I, figg. 1, 1*a*).

The two proximal ridges of the hydroecium are not serrated distally; they are $^1/_4$ longer than the distal ones, so the lateral ridges have a curved course. Anteriorly the nectophore is curved convexly, posteriorly this is even more marked; the size of the hydroecium is therefore very important, the breadth of the hydroecial cavity is f. i. twice as big as the breadth of the nectosac taken on the same level (6 mm. and 2 mm.). The height of the hydroecium is 9 mm. (measured from the basal transverse ridges to the implantation of the stem).

The somatocyst is very long, tube-like, its course is curved, it is narrow near the stem and goes some way up close to the wall of the nectosac.

The nectosac is about 3 mm. broad, its course is parallel to the dorsal ridge; near the proximal part of the nectophore it narrows out into a thread-like appendage. The damage it had undergone, prevented us from finding out how long this upper part is.

The stem is well-preserved; it shows, besides the undeveloped groups, fourteen developed

ones. These consist of a siphon, a group of tentilla and some small buds, probably the bract and the gonophore.

On Pl. VI, fig. 52 we gave a sketch of one of these developed groups; it shows clearly the siphon, the bract, the tentilla and one bud, the future gonophore. There is no trace to be seen of the development of a special gonocalyx in the group.

So instead of using the genusname *Diphyopsis*, we go back again to the original name *Diphyes* as it was given by CHAMISSO and EYSENHARDT, being convinced that the Siboga-specimens are identical to theirs.

23. *Diphyes Nierstraszi* nov. spec. Pl. VII, fig. 53.

Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.G. formald. 4°/₀. 19 superior nectophores.
Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 N. formald. 4°/₀. 3 superior nectophores.
Stat. 112. Lat. 3° 1′ N., Long. 122° 2′ E. *Cat.* 76 B. alc. 90°/₀. 3 superior nectophores.
Stat. 125. Anchorage off Sawan, Siau-island. *Cat.* 36 D. alc. 90°/₀. One superior nectophore.
Stat. 141. Lat. 1° 0′.4 S., Long. 127° 25′.3 E. *Cat.* 44 F.H. formald. 4°/₀. One superior nectophore.
Stat. 144. Anchorage North of Salomakië-(Damar-)island. *Cat.* 122 C. formald. 4°/₀. 10 superior nectophores.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 B. formald. 4°/₀. 5 superior nectophores.
Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.A. formald. 4°/₀. 2 superior nectophores.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A A. (2). formald. 4°/₀. 2 superior nectophores.
Stat. 220. Anchorage off Pasir Pandjang; West-coast of Binongka. *Cat.* 77 A. formald. 4°/₀. 3 superior nectophores.

The length of these 50 specimens varied from 7 to 15 mm. They differ essentially from *Diphyopsis campanulifera* Q. et G. which is described on p. 49 through the absence of any special nectophore in the groups of appendages and also through the difference in size. There were only superior nectophores, though some very much developed inferior ones were to be found on the stem of a few specimens. Another difference with *Diphyopsis campanulifera* is the length of the stem between two groups of appendages. In *Diphyes Nierstraszii* there is a considerable distance between two groups. This occurs in all the specimens whose groups are sufficiently well-developed. It is not merely in some of them that we noticed this particularity. At the same time we found only four developed groups on one specimen; in *Diphyopsis campanulifera* of the Siboga expedition we have found a much larger number (see Pl. VIII, fig. 63). These groups are also much larger in size than the same in *Diphyopsis campanulifera* at the same stage of development. The shape of the nectophores, of the nectosac, the somatocyst, the hydroecium etc. is the same as in *Diphyopsis*.

Diphyes indica nov. spec.
Diphyes (Diphyopsis) malayana nov. spec.
Diphyes (Diphyopsis) Gegenbauri nov. spec.

Diphyes contorta was in itself easily to be distinguished from all other *Diphyids* through

the torsion of the somatocyst. So was *Diphyes dispar* as it has a very remarkable shape and is of larger size than any other *Diphyids* in the Siboga expedition. *Diphyes Nierstraszi* too was easily to be distinguished from the other *Diphyids*. But the following species *Diphyes indica* nov. spec., *Diphyes (Diphyopsis) malayana* nov. spec., *Diphyes (Diphyopsis) Gegenbauri* nov. spec. form a natural group of closely related species. They are easily to be distinguished one from the other as our figures demonstrate (compare Pl. VII, figg. 53—57, Pl. VIII, fig. 58) but we tried first to identify them with known *Diphyopsinae*, being reluctant to add more new names unless inevitable. We thought first of all of the superior nectophores of *Doramasia bojani* Ch. when we examined the same in *Diphyes indica*. This may seem strange as CHUN called *Doramasia bojani* a *Monophyid*. But he only mentions (**92** p. 110) having captured them together in the Pacific Ocean with *Ersaea bojani*. This does not imply that they belong to each other. He never saw any *Ersaeids* developing themselves on the stem of *Doramasia bojani*. In the description of *Diphyes indica* we will mention points of similarity between this species and the latter. We also compared the descriptions of *Diphyes serrata* Ch. **88**, **97a** and of *Diphyes Steenstrupii* Ggbr. **60** with our new specimens *Diphyes (Diphyopsis) malayana* and *Diphyes (Diphyopsis) Gegenbauri*.

Altogether the three new names are given with some hesitation. The not very perfect state of preservation, the absence of inferior nectophores and of any well-preserved stem and appendages leave room for some diffidence. We will however now pass on to their description.

24. *Diphyes indica* nov. spec. Pl. VII, fig. 54.

Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 G. alc. 90°/₀. 2 specimens.
Stat. 118. Lat. 1° 38' N., Long. 124° 28'.2 E. *Cat.* 93 B.A. alc. 90°/₀. One specimen.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.B. alc. 90°/₀. 3 specimens.
Stat. 225. 5700 M. N. 279° E. from South-point of South-Lucipara-island. *Cat.* 45 A. alc. 90°/₀. 7 specimens.
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 138 H. alc. 90°/₀. One specimen.

All the specimens being preserved in alcohol 90°/₀, we are sorry to say that there are none that are absolutely complete. First of all the inferior nectophores failed and of the superior ones the stem was very much altered. Still we find these 8 superior nectophores different from the other *Diphyids* of the Siboga material. Their length is about 9—11 mm. the breadth 2—2½ mm. They are very slender, elongated specimens.

Taking them sideways (Pl. VII, fig. 54) one is struck by the great similarity to the sketch of *Doramasia bojani* Ch. **92** this doubtful *Monophyid*. The length of the cylindrical nectosac, the position of the somatocyst and the hydroecium and even, though in lesser degree, the curve which the five ridges describe in the upper third part of the nectophore are more or less similar. But the lateral teeth of the ridges at the basal side are more developed, and more scale-like than the *Doramasia bojani*. Sometimes, in *Diphyes indica*, these lateral teeth are so big that they overlap the dorsal one.

There is some resemblance too, we suppose, with CHUN's *Diphyes serrata* (**88**) but up to now we have no sketches of this species and the description is not quite complete. Moreover

the curve in the upper part of the ridges does not occur in *Diphyes serrata* according to CHUN (**88** p. 1858, **97a** p. 26). The dorsal ridge of these 8 specimens is not serrated, the basal part of the four others only slightly; the basal ones of the hydroecial cavity do not show any serrating.

There is one specimen (Cat. 138 H.) the stem of which is yet clearly preserved. We there notice the development of a bud, a future gonophore, but no traces could be found of a bud for a young special nectophore in the oldest group of appendages.

So we use here the genusname *Diphyes*, although the shape of the nectosac is the same as HAECKEL **88b** describes for *Diphyopsis*.

25. *Diphyes (Diphyopsis) malayana* nov. spec. Pl. VII, figg. 55, 56.

Stat. 117ᵃ. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 A. formald. $4_0/^0$. One superior nectophore.
Stat. 185. Lat. 3° 20′ S., Long. 127° 22′.9 E. *Cat.* 100 A. (2). formald. $4^0/_0$. 3 superior nectophores.

Length of the superior nectophore 9—10 mm. We found some similarity between *Diphyes (Diphyopsis) malayana* and CHUN's *Diphyes serrata* (**88**). Unfortunately the two descriptions (**88**, **97a**) are yet incomplete. In 1897 he promises to give a more accurate description which however, up to this time, has not yet appeared. Of the hydroecium he tells us that it shows differences with the hydroecium in *Diphyes Steenstrupii*, but he does not tell us which are these differences. He even omits to give the different measures. The only characteristic given, by which to our opinion *Diphyes serrata* differs from *Diphyes Steenstrupii* Ggbr. is the scale-like shape of the lateral teeth near the velum. These are less well-developed, more elongate in *Diphyes Steenstrupii* and in our *Diphyes (Diphyopsis) Gegenbauri*. We have often thought how remarkably well the description of CHUN's *Diphyes serrata* fits in with his description of *Doramasia bojani* Ch. But these are of course only suppositions. We hope that CHUN will soon provide us with a more complete description of both *Doramasia bojani* and *Diphyes serrata*. Our *Diphyes (Diphyopsis) malayana* is to be distinguished from *Doramasia bojani*, by the shape of the upper part of the nectophore.

In our species there are originally at the apex four ridges, but very soon the ventral ridge divides itself into two. One of these ridges forms the left lateral ridge, ending in the left lateral tooth near the velum, the other is part of the ventral facet; it is the most distally situated ridge in the nectophore. This is only on the left side; for if this division had also occurred on the right side, there would have been six ridges. In *Diphyes Steenstrupii*, GEGENBAUR says that the ventral ridge divides itself sooner or later ("früher oder später"). This occurs quite near the top in our new species but this makes no great difference. This division of the four ridges into five, distinguishes our *Diphyes (Diphyopsis) malayana* from CHUN's *Diphyes serrata* which consists entirely of five ridges.

The difference between *Diphyes Steenstrupii* and *Diphyes (Diphyopsis) Gegenbauri* lies in the shape of the lateral teeth as is said above. They are very much developed and broad. It differs from *Diphyes indica* through the absence of the wing-like enlargements in the upper third part of the ridges; moreover the hydroecium-ridges are convex.

The ridges in *Diphyes (Diphyopsis) malayana* are slightly serrated in the distal part of the nectophore. The lateral teeth are much more developed than the dorsal one.

The nectosac is cylindrical, narrows out very gradually; it has the shape of a true *Diphyes*. It is accompanied by the tubular, elongated somatocyst which is nearly of the same breadth from top to base. The hydroecium-top is situated a little above the last third part of the whole length of the nectophore.

In two specimens we could clearly see the young bud of the inferior nectophore, but nothing can be said of the clusters of appendages, which are badly preserved and incomplete. We could not find out whether there are special nectophores in the groups.

26. *Diphyes (Diphyopsis) Gegenbauri* nov. spec. Pl. VII, fig. 57; Pl. VIII, fig. 58.

Stat. 136. Ternate-anchorage. *Cat.* 80 S. (2). formald. 4°/₀. 2 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 B. formald. 4°/₀. One specimen.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 A. (2). formald. 4°/₀. One specimen.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.B. (2). alc. 90°/₀. One complete specimen.

The four superior nectophores are very slender, tiny and delicate. Their length varies from $6^1/_2$—$8^1/_2$ mm. At first sight they resemble very much the upper nectophores of *Doramasia bojani* Ch. or our *Doramasia pictoides*. But also here the division occurs of one of the four principal ridges into two (Pl. VIII, fig. 58) near the apex of the nectophore. In this respect they resemble *Diphyes Steenstrupii* Ggbr. and *Diphyes (Dihyopsis) malayana*. They have also lateral teeth possessing the same shape as in *Diphyes Steenstrupii* Ggbr. The points of resemblance with the latter are numerous; the ventral ridges of the hydroecium only having a more inclined, concave course. All the ridges are serrated; the dorsal tooth differs one third in length from the lateral ones.

The nectosac narrows very gradually towards the top of the nectophore. The somatocyst is narrow, nearly of the same breadth and runs along the lateral sides of the nectosac.

The hydroecium has the same position as in *Diphyes (Diphyopsis) malayana*.

As is shown above there is a great resemblance with *Doramasia pictoides*, but we have distinctly seen a bud, the future inferior nectophore in one of our specimens and we even possess a complete specimen (Cat. 50 C.B. (2)). Unfortunately the inferior nectophore is absolutely unrecognizable; it has quite shrivelled up through the preservation.

Another specimen (Cat. 80 S. (2)) shows a distinct group of appendages; the bract is developed but no traces are to be found of any gonophores or special gonocalyces. So we cannot make any conclusion about these four nectophores belonging to the genus *Diphyes* or *Diphyopsis*.

27. *Diphyes (Diphyopsis) subtiloides* nov. spec. Pl. VII, figg. 59, 60, 61.

Stat. 104. Sulu-harbour, Sulu-island. *Cat.* 103 A. alc. 90°/₀. 4 specimens.
Stat. 117ᵃ. Lat. 1° 15 N., Long. 123° 37′ E. *Cat.* 137 B. alc. 90°/₀. One specimen.
Stat. 136. Ternate-anchorage. *Cat.* 80 I. formald. 4°/₀. 18 specimens and *Cat.* 67 B.C. alc. 90°/₀. 8 specimens.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 A. formald. 4°/₀. 3 specimens and *Cat.* 92 A. alc. 90°/₀. One specimen.
Stat. 141. Lat. 1° 0′.4 S., Long. 127° 25′.3 E. *Cat.* 44 F.F. formald. 4°/₀. One specimen.

Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 C. formald 4°/₀. 18 specimens.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 H. formald. 4°/₀. 2 specimens.
Stat. 149. Fau-anchorage and lagune. West-coast of Gebé-island. *Cat.* 66 A. alc. 90°/₀. 3 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 B. formald. 4°/₀. 2 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 A. formald. 4°/₀. 14 specimens.
Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. *Cat.* 142 I. alc. 90°/₀. One specimen.
Stat. 186. Lat. 3° 10′.5 S., Long. 127° 20′.5 E. North-side of Manipa-strait. *Cat.* 25 V.F. formald. 4°/₀. 16 specimens.
Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.F. formald. 4°/₀. 5 specimens and *Cat.* 127 F.G. alc. 90°/₀. 2 specimens.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.A. formald. 4°/₀. One specimen.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 A. formald. 4°/₀. One specimen.
Stat. 229. Lat. 4° 23′ S., Long. 128° 45′.5 E. *Cat.* 82 B. formald. 4°/₀. 6 specimens.

Of this new species 110 superior nectophores were captured. *Diphyes (Diphyopsis) subtiloides* is closely allied to *Diphyes subtilis* Chun **86**. In 1885 Chun described a superior nectophore of a *Diphyid*-like shape and another nectophore, whose characteristics were the absence of any somatocyst and the position of the small stem and appendages in the top of the nectocalyx. He judges the former to be the primary nectophore of the Monophyid *Monophyes irregularis*, the latter the primary nectophore of the Monophyid *Sphaeronectes gracilis*. He had come to this conclusion by the shape and disposition of the groups of appendages on the stem. These are, he tells us, absolutely identical in the above-mentioned nectophores to those in the Monophyids, *Monophyes irregularis* and *Sphaeronectes gracilis*. He tells us how in *Monophyids* there are besides the groups, consisting of buds for future siphon, tentacle, bract and gonophore yet other groups consisting only of future bract and gonophore. This, he says, is quite characteristic for *Monophyids*. In *Diphyids* such undeveloped groups are never to be found.

In 1886 he corrects his work of 1885. He finds that the so-called primary nectophores of *Monophyids* are the superior and inferior nectophores of a new Diphyid, *Diphyes subtilis*, of which after a long search he found a complete specimen.

What about the development of the incomplete groups between the complete ones? About this important matter he tells us nothing at all although he finds specimens with twenty-four groups of appendages.

We had the opportunity of studying *Diphyes subtilis* in Naples, where during the months of January and February 1906, loose superior and inferior, and often complete specimens occurred every day in the plankton. But we unfortunately never found any well-developed appendages. They were all exceedingly tiny specimens, very fragile and we suppose that the least disturbance on or near the nectophores occasions the falling off of the inferior nectophores and of the stem. In fact we found many times loose inferior nectophores with the very tiny stem and appendages clasped yet between the wing-like ridges, in the superior part such as Chun sketched (**85** fig. 5). But as to a further investigation into the disposition of the appendages of the stem, we had to give that up as we had no occasion to remain longer in Naples.

It has been of much use to us to have been able to examine live *Diphyes subtilis* Ch.

as in the Siboga expedition there were about 110 specimens which had the greatest resemblance with CHUN's species. The only difference was the shape of the somatocyst and the shape of the top of the nectophore which in our type was more pointed. But this latter detail seems to be of less importance.

We found in all mediterranean *Diphyes subtilis* that the somatocyst is rounded, club-shaped with a long thread stalk. Even when put in formaldehyd this shape did not change, it is exactly as CHUN figures it (**85** fig. 3).

In our specimens the somatocyst is of a cylindrical shape, sometimes only $^1/_6$ of the whole length of the nectophore, sometimes longer ($^1/_4$, $^1/_3$). It is always tubular, only gets narrower near the base, near the implantation of the stem.

So we think our specimens of the tropical Pacific different from CHUN's mediterranean specimens and we use the specific denomination "*subtiloides*" to denote the close connection between the two. The length of the superior nectophores is 5—6 mm., the breadth 2—2$^1/_2$ mm.

The superior nectophore is very fragile, the gelatinous substance is inconsistent. The nectosac is a long cylindrical tube, the top reaches very far proximally into the gelatinous substance; on the whole the nectosac is too much developed for the fragility of the nectophore. Of the course of the canals nothing could be seen. There are five ridges, a proximal dorsal odd one, a pair of lateral ones, and a pair of ventral ones, forming the ventral facet of the nectophore. None of these are prominent, nor serrated; the whole nectophore is smooth and flabby. We have already spoken of the somatocyst.

The stem and appendages were incompletely preserved; in one of the specimens a bud, the future inferior nectophore was to be seen. As to the development of siphon, tentilla, bract, gonophore, special nectophore or no special nectophore, nothing was clearly enough preserved for further investigation.

Eudoxia Eschsch.

28. *Eudoxia campanula* Lkt. Pl. VII, fig. 62.

= *Eudoxia campanula* Lkt. 53.
= *Eudoxia messanessis* Ggbr. 54.
= *Cucullus Gegenbauri* Hkl. 88*a*.
= *Cucullus campanula* Hkl. 88*b*.

Stat. 36. Lat. 7° 38' S., Long. 117° 31' E. *Cat.* 41 D. alc. 90°/$_0$. One incomplete specimen.
Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 C. alc. 90°/$_0$. 3 incomplete, one complete specimen.
Stat. 118. Lat. 1° 38' N., Long. 124° 28'.2 E. *Cat.* 93 B.E. alc. 90°/$_0$. 3 specimens.
Stat. 136. Ternate-anchorage. *Cat.* 80 K. formald. 4°/$_0$. One specimen.
Stat. 138. Anchorage on the East-coast of Kajoa-island. *Cat.* 172 E. formald. 4°/$_0$. 2 specimens and *Cat.* 92 D. alc. 9°/$_0$. One specimen.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 B. formald. 4°/$_0$. 3 complete, 22 incomplete specimens.
Stat. 149. Fau-anchorage and lagune, West-coast of Gebé-island. *Cat.* 66 B. alc. 90°/$_0$. 5 specimens.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 G. formald. 4°/$_0$. One complete, 3 incomplete specimens.

Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 A. formald. 4°/$_{0}$. 2 complete, 24 incomplete specimens.

Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 A. formald. 4°/$_{0}$. One complete, 7 incomplete specimens.

Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 E. formald. 4°/$_{0}$. 29 complete, 65 incomplete specimens.

Stat. 177^{a}. Lat. 2° 30′ S., Long. 129° 28′ E. *Cat.* 95 F. alc. 90°/$_{0}$. 97 incomplete, 7 complete specimens.

Stat. 189^{a}. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.I. formald. 4°/$_{0}$. 2 complete, 7 incomplete specimens.

Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.G. formald. 4°/$_{0}$. One complete, 29 incomplete specimens.

Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 144 A. alc. 90°/$_{0}$. 3 incomplete specimens.

We were very much surprised to find only *Eudoxia campanula* Lkt. and no specimens of *Diphyes Sieboldii* to which it belongs. We cannot account for its absence. Of course there are still a great number left of superior nectophores which through their bad preservation could not be determined. Perhaps there may have been some *Diphyes Sieboldii* between these. We had the occasion of observing live specimens of this *Diphyid* in Naples, and we are quite sure these differ from all the *Diphyopsinae* of the Siboga expedition, even when we take into account the difficulty of comparing live specimens with preserved material.

The specimens of *Eudoxia campanula* Lkt. were fairly well-preserved. They do not differ in structure from the original *Eudoxia campanula* of Leuckart's **53** as may be seen by our sketch (Pl. VII, fig. 62).

Diphyopsis Hkl.

29. *Diphyopsis campanulifera* Q. et G. Pl. VIII, fig. 63.

= *Diphyes* Quoy et Gaimard. 27.
= *Diphyes campanulifera* Eschsch. 29
= *Diphyes* Blainville 30.
= *Diphyes Bory* Quoy et Gaimard 33.
= *Diphyes campanulifera* Ggbr. 60.
= *Diphyopsis campanulifera* Ch. 88.
= *Diphyopsis compressa* Hkl. 88*b*.

Stat. 36. Lat. 7° 38′ S., Long. 117° 31′ E. *Cat.* 41 A. alc. 90°/$_{0}$. 2 superior nectophores.

Stat. 96. South-east side of Pearl-bank, Sulu-archipelago. *Cat.* 135. formald. 4°/$_{0}$. One superior nectophore.

Stat. 99. Lat. 6° 7′.5 N., Long. 120° 26′ E. Anchorage off North Ubian. June 28 and 29 to the West; June 30 to the East of the island. *Cat.* 70 B. alc. 90°/$_{0}$. 2 superior nectophores.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 N. (1). formald. 4°/$_{0}$. One superior nectophore of ? *Diphyopsis campanulifera*.

Stat. 119. Lat. 1° 33′.5 N., Long. 124° 41′ E. *Cat.* 32 A. formald. 4°/$_{0}$. One complete specimen.

Stat. 136. Ternate-anchorage. *Cat.* 80 A. formald. 4°/$_{0}$. 2 complete, 7 loose superior, 4 loose inferior nectophores.

Stat. 143. Lat. 1° 4′.5 S., Long. 127° 52′.6 E. *Cat.* 86 D. alc. 90°/$_{0}$. 2 superior nectophores.

Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 D. formald. 4°/$_{0}$. 2 inferior nectophores of ? *Diphyopsis campanulifera*.

Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 G. formald. 4°/₀. One superior nectophore of ? *Diphyopsis campanulifera.*

Stat. 165. Anchorage on North-east side of Daram-islands (False Pisangs), East-coast of Misool. *Cat.* 164 O. formald. 4°/₀. 2 superior, 2 inferior nectophores, the last being badly preserved.

Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. *Cat.* 142 E. alc. 90°/₀. One superior nectophore.

Stat. 185. Lat. 3° 20′ S., Long. 127° 22′.9 E. Manipa-strait from 1536 M. to surface. *Cat.* 100 A. (1). formald. 4°/₀. 2 superior nectophores.

Stat. 189ᵃ. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.P. formald. 4°/₀. One inferior nectophore of ? *Diphyopsis campanulifera.*

Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.A. formald. 4°/₀. One complete specimen, One complete specimen, one inferior nectophore of ? *Diphyopsis campanulifera.*

Stat. 194—197. (194 = Lat. 1° 53′.5 S., Long. 126° 39′ E. 195 = Lat. 1° 55′ S., Long. 126° 50′.7 E. 196 = Lat. 1° 52′.8 S., Long. 127° 6′ E. 197 = Lat. 1° 45′.3 S., Long. 127° 8′.3 E.). *Cat.* 75 B.A. alc. 90°/₀. 5 superior nectophores.

Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 173 C.B. formald. 4°/₀. One superior nectophore and *Cat.* 126 C. alc. 90°/₀. 12 superior nectophores.

Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 C.B. alc. 90°/₀. One superior nectophore.

Stat. 217. Lat. 6° 40′.6 S., Long. 123° 14′.7 E. *Cat.* 120. formald. 4°/₀. One complete specimen.

Stat. 282. Lat. 8° 25′.2 S., Long. 127° 18′.4 E. Anchorage between Nusa-Besi and the N.E. point of Timor. *Cat.* 51 B. alc. 90°/₀. One superior nectophore.

Ersaea Eschsch.

30. *Ersaea Lessoni* Huxl. Pl. VIII, fig. 64.

= ? *Ersaea Gaimardi* Eschsch. 29.
= ? *Eudoxia Lessonii* Eschsch. 29.
= *Eudoxia Lessonii* Huxl. 59.
= *Eudoxia Lessonii* Fewk. 81.
= *Ersaea compressa* Hkl. 88.
= *Ersaea Lessonii* Chun 97a.

Stat. 36. Lat. 7° 38′ S., Long. 117° 31′ E. *Cat.* 41 C. alc. 90°/₀. One specimen.

Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.A. formald. 4°/₀. 11 complete, 5 incomplete specimens.

Stat. 96. South-east side of Pearl-bank, Sulu-archipelago. *Cat.* 99 F. alc. 90°/₀. 48 specimens.

Stat. 99. Lat. 6° 7′.5 N., Long. 120° 26′ E. Anchorage off North-Ubian. June 28, 29 to the West; June 30 to the East of the island. *Cat.* 70 D. alc. 90°/₀. 18 specimens.

Stat. 104. Sulu-harbour Sulu-island. *Cat.* 103 C. alc. 90°/₀. 5 specimens.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 J. formald. 4°/₀. 20 specimens.

Stat. 109. Anchorage off Pulu-Tongkil, Sulu-archipelago. *Cat.* 87 D. formald. 4₀/°. One specimen.

Stat. 110. Lat. 4° 34′ N., Long. 122° 0′ E. *Cat.* 47 B. formald. 4°/₀. 3 specimens.

Stat. 117ᵃ. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 B. formald. 4°/₀. 50 specimens and *Cat.* 137 A. alc. 90°/₀. 120 specimens.

Stat. 122. Lat. 1° 58′.5 N., Long. 125° 0′.5 E. *Cat.* 73 B. formald. 4°/₀. 19 specimens.

Stat. 125. Anchorage off Sawan-Siau island. *Cat.* 36 C. alc. 90°/₀. 7 complete specimens.

Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 B. formald. 4°/₀. 21 specimens.

Stat. 146. Lat. 0° 36′ S., Long. 128° 2′.7 E. *Cat.* 64 E. formald. 4°/₀. 6 specimens.

Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 59 A. alc. 90°/₀. One complete specimen.

Stat. 149. Fau-anchorage and lagune, West-coast of Gebé-island. *Cat.* 66 B. alc. 90°/₀. 8 specimens.

Stat. 165. Anchorage on North-east side of Daram-island, East-coast of Misool. *Cat.* 164 A. formald. 4°/₀. 21 specimens.

Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 A. formald. 4°/₀. 11 complete specimens.
Stat. 169. Anchorage off Atjatuning, West-coast of New Guinea. *Cat.* 55 A. formald. 4°/₀. 10 specimens and *Cat.* 149 A. alc. 90°/₀. 20 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 E. formald. 4°/₀. 24 specimens.
Stat. 174. Waru-bay, North-coast of Ceram. *Cat.* 35 F. alc. 90°/₀. 8 specimens.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 39' E. *Cat.* 23 A.D. formald. 4°/₀. 5 specimens.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 126 A. alc. 90°/₀. 19 specimens.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 102 C. formald. 4°/₀. 26 specimens and *Cat.* 50 C.A. alc. 90°/₀. 112 specimens.
Stat. 210ᵃ. Lat. 5° 26' S., Long. 121° 18' E. *Cat.* 56 A. formald. 4°/₀. 9 specimens.
Stat. 213. Saleyer-anchorage and surroundings, including Pulu Pasi Tanette, near the North-point of Saleyer-island. *Cat.* 78 B. alc. 90°/₀. 2 specimens.
Stat. 223. Lat. 5° 44'.7 S., Long. 126° 27'.3 E. *Cat.* 31 B. alc. 90°/₀. One specimen.
Stat. 245. Lat. 4° 16'.5 S., Long. 130° 15'.8 E. *Cat.* 143 E. alc. 90°/₀. 5 specimens.
Stat. 315. Sailus Besar, Paternoster-islands. *Cat.* 129 A. formald. 4°/₀. 70 specimens.

Diphyopsis campanulifera Q. et G.

This very well-known species *Diphyopsis campanulifera* Q. et G. is found in rather large quantities in the Siboga material. They are by far the best preserved. They owe this to their great consistency, the gelatinous substance being well-developed and firm.

We found four complete specimens one of which we sketched (Pl. VIII, fig. 63) 42 loose superior nectophores and 9 loose inferior ones. These latter however are not well-preserved enough to make us feel sure that they indeed belong to *Diphyopsis campanulifera* Q. et G.

The four complete ones are at the same time the largest in size, of Cat. 32 A. the length of the two nectophores is 33 mm. of Cat. 80 A. 28 mm. and 20 mm., sizes which we only found back in *Diphyabyla*.

The sketch given is of Cat. 80 A. size 28 mm. The stem and appendages are well-preserved in this specimen. The difference in size of the groups of appendages with relation to the size of the superior nectophore should be particularly noticed and the same in *Diphyes Nierstraszii* which perhaps is closely related to *Diphyopsis campanulifera*.

The *eudoxid* of the latter, *Ersaea Lessoni* Huxl. we found in the unusual great number of 714 specimens, the largest quantity of one species of *Calycophorae* of the Siboga expedition.

These specimens vary in size but do not show any structural difference with the *Ersaea Lessoni* as it was once described very clearly by Huxley **59**, Fewkes **81** etc.

For completeness' sake we give a sketch of one of the more perfect specimens.

31. *Diphyopsis diphyoides* nov. spec. Pl. VIII, figg. 65, 66.

Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 O. formald. 4°/₀. 2 specimens.
Stat. 109. Anchorage off Pulu-Tongkil, Sulu-archipelago. *Cat.* 87 B. formald. 4°/₀. One specimen.
Stat. 117ᵃ. Lat. 1° 15' N., Long. 123° 37' E. *Cat.* 137 B. alc. 90°/₀. 2 specimens.
Stat. 125. Anchorage off Sawang, Siau-island. *Cat.* 36 B. alc. 90°/₀. 4 specimens.
Stat. 136. Ternate-anchorage. *Cat.* 80 H. formald. 4°/₀. 9 specimens and *Cat.* 67 B.F. alc. 90°/₀. 4 specimens.
Stat. 143. Lat. 1° 4'.5 S., Long. 127° 52'.6 E. *Cat.* 86 B. alc. 90°/₀. 3 specimens.

Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 C. formald. $4°/_{o}$. 16 specimens.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 59 D. alc. $90°/_{o}$. 5 specimens.
Stat. 157. Lat. 0° 32'.9 S., Long. 130° 14'.6 E. *Cat.* 198 C. alc. $90°/_{o}$. 2 specimens.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 E. formald. $4°/_{o}$. 2 specimens and *Cat.* 148 B.F. alc. $90°/_{o}$. 3 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 B. formald. $4°/_{o}$. 3 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 A. formald. $4°/_{o}$. 5 specimens.
Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. *Cat.* 142 H. alc. $90°/_{o}$. 4 specimens.
Stat. 185. Lat. 3° 20' S., Long. 127° 22'.9 E. Manipa-strait. *Cat.* 100 A. formald. $4°/_{o}$. 4 specimens.
Stat. 186. Lat. 3° 10'.5 S., Long. 127° 20'.5 E. Northside of Manipa-strait. *Cat.* 25 V.D. formald. $4°/_{o}$. One specimen.
Stat. 189ᵃ. Lat. 2° 22' S., Long. 126° 46' E. *Cat.* 65 D.J. formald. $4°/_{o}$. 2 specimens and *Cat.* 127 F.C. alc. $90°/_{o}$. 7 specimens.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 39' E. *Cat.* 23 A.A. formald. $4°/_{o}$. One specimen.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 126 C. alc. $90°/_{o}$. 23 specimens.
Stat. 215ᵃ. West 1000 M. distant from North-point of Kabia-island reef. *Cat.* 128 A. alc. $90°/_{o}$. One specimen.
Stat. 220. Anchorage off Pasir-Pandjang, West-coast of Binongka. *Cat.* 77 A. formald. $4°/_{o}$. 6 specimens and *Cat.* 144 B. alc. $90°/_{o}$. 4 specimens.
Stat. 221. Lat. 6° 24' S., Long. 124° 39' E. *Cat.* 121. alc. $90°/_{o}$. One specimen.
Stat. 225. 5700 M. N. 279° E. from South-point of South Lucipara-island. *Cat.* 45 D. alc. $90°/_{o}$. 3 specimens.
Stat. 245. Lat. 4° 16'.5 S., Long. 130° 15'.8 E. *Cat.* 143 A. alc. $90°/_{o}$. 10 specimens.
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 138 G. alc. $90°/_{o}$. One specimen.
Stat. 304. Between Lamararap, Lomblen-island and Lamakera, Solor-island. Horizontal cylinder towed over a distance of 36 miles. *Cat.* 131. alc. $90°/_{o}$. One specimen.

In this new species of which we had 130 specimens (average length 7 mm. and breadth $1^1/_2$ mm.) the inferior nectophores always failed as in many other *Diphyopsinae* of the Siboga expedition. The preservation is insufficient as concerns stem and appendages. We looked a long time for the bud of an inferior nectophore and we had nearly given up the task, when we hit upon Cat. 80 H.I. This number contained 9 specimens of which one possessed a bud, the future inferior nectophore. Another specimen of another station (Stat. 165) showed us clearly a bud of a special gonocalyx in the oldest group of appendages. So we arranged this new species under *Diphyopsis*, while the specific name "*diphyoides*" denotes the great outward resemblance of the superior nectophore with the same in *Diphyes*.

The gelatinous substance is not much developed owing to the important size of the nectosac. Still the ridges are very clearly marked. They are all slightly serrated near the base of the nectophore. There are five ridges; the apex of the nectophore is somewhat blunt. The course of the ridges is a slightly convex one.

Characteristic of the species is the absence of any development in the lateral teeth, the continuation of the lateral ridges. The basal ridges (Pl. VIII, fig. 66*a*) have only just a slight concave course, but real lateral teeth there are none. The odd dorsal tooth is well-developed though not as much as in other *Diphyopsinae*.

The nectosac is large, cylindrical, rounded, of nearly the same breadth throughout its length; the apex is blunt. The course of its canals was not to be seen in consequence of bad

preservation. The position of the hydroecium is also characteristic of the species. It is situated near the base of the nectosac, so the hydroecial cavity is small. Its basal ridges are concave. The implantation of the stem is a little higher than in f. i. *Diphyes contorta*.

The somatocyst has in our sketch of Cat. 80 H.I. (Pl. VIII, fig. 65) a very irregular aspect. It is generally less broad, more cylindrical, but never longer or more pointed. It and the hydroecial cavity generally measure half of the length of the whole nectophore.

With the exception of one specimen all the appendages in others were badly preserved. We cannot however give any description of a group of appendages through the general state of preservation.

32. *Diphyopsis Weberi* nov. spec. Pl. VIII, figg. 67, 68.

Stat. 50. Bay of Badjo, West-coast of Flores. *Cat.* 166 C.F. formald. 4°/₀. 4 specimens.
Stat. 93. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. *Cat.* 79 F. alc. 90°/₀. 2 specimens.
Stat. 96. South-east side of Pearl-bank, Sulu-archipelago. *Cat.* 99 A. alc. 90°/₀. 3 specimens.
Stat. 104. Sulu-harbour, Sulu-island. *Cat.* 40. formald. 4°/₀. 8 specimens and *Cat.* 103 B. alc. 90°/₀. 34 specimens.
Stat. 106. Anchorage off Kapul-island, Sulu-archipelago. *Cat.* 91 H. formald. 4°/₀. 39 specimens.
Stat. 109. Anchorage off Pulu-Tongkil, Sulu-archipelago. *Cat.* 87 A. formald. 4°/₀. 28 specimens and *Cat.* 34 C.A. alc. 90°/₀. 29 specimens.
Stat. 117[a]. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 C. formald. 4°/₀. 33 specimens.
Stat. 136. Ternate-anchorage. *Cat.* 80 L. formald. 4°/₀. One specimen.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 C. formald. 4°/₀. 8 specimens.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 J. formald. 4°/₀. One specimen.
Stat. 149. Fau-anchorage and lagune, West-coast of Gebé-island. *Cat.* 66 A. alc. 90°/₀. One specimen.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 F. formald. 4°/₀. 29 specimens and *Cat.* 148 B.E. alc. 90°/₀. 5 specimens.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 B. formald. 4°/₀. 11 specimens.
Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 B. formald. 4°/₀. 11 specimens and *Cat.* 149 B. alc. 90°/₀. 3 specimens.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 42 A. formald. 4°/₀. 8 specimens.
Stat. 174. Waru-bay, North-coast of Ceram. *Cat.* 35 D. 90°/₀. 2 specimens.
Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. *Cat.* 142 D. alc. 90°/₀. 4 specimens.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 102 A. formald. 4°/₀. 10 specimens.
Stat. 282. Lat. 8° 25′.2 S., Long. 127° 18′.4 E. Anchorage between Nusa Besi and the N.E.-point of Timor. *Cat.* 51 C. alc. 90°/₀. 5 specimens.
Stat. 315. Anchorage East of Sailus Besar, Paternoster-islands. *Cat.* 129 B. alc. 90°/₀. One specimen.

Of the 272 superior nectophores of this new species the average length and breadth are 7 mm. and $1^1/_2$ mm. There are no inferior nectophores. They had all dropped off, and we found in many specimens a well-developed bud for the future inferior nectophore.

The nectophores have a decidedly rounded appearance owing to the slight development of the gelatinous substance around the large nectosac. There are five ridges, clearly defined, serrated near the base as in *Diphyopsis diphyoides*; their course is convex, moreover the two

lateral ridges bend very much to the proximal, odd dorsal one. So they are not exactly on the lateral sides of the nectophore, but more antero-lateral. They bend downwards near the basal part of the nectosac and end into two well-marked elegantly shaped lateral teeth. The dorsal tooth of the proximal ridge is curved and of the same length as the lateral ones. The nectosac is cylindrical, blunt at the apex, of nearly the same breadth throughout its length, its top is blunt. We found a dark pigment spot in the top, such as is found in *Diphyopsis campanulifera*, but of the course of the canals in the nectosac nothing was visible.

The hydroecium is elongate-campanulate. It is situated very near the half of the length of the nectophore, a higher position than was found in the other *Diphyopsinae* of the Siboga expedition. Its limits near the antero-ventral points and the postero-ventral ones form an oblique line, the postero-ventral ridges being shorter than the antero-ventral ones. These ridges however are not concave but straight.

The somatocyst is of the same length in proportion to the hydroecial cavity as in *Diphyopsis diphyoides*. It seems to be a little larger near the middle-part, not being absolutely cylindrical.

Of stem and appendages nothing particular can be said owing again to the preservation. In Cat. 55 B.I. five more developed groups are to be seen, well divided one from the other; still they are not mature, for the shape of the bracts is not yet well defined. They show, besides the bud for the future gonophore, also the bud for the special gonocalyx. As Cat. 55 B.I. was the best preserved nectophore of all, we had to use it for our sketch, though the stem had detached itself from the base of the somatocyst and this makes our sketch indistinct and irregular.

We dedicate this elegant little *Diphyid* to the eminent leader of the Siboga expedition.

33. *Diphyopsis anomala* nov. spec. Pl. VIII, fig. 69; Pl. IX, fig. 70.

Stat. 213. Saleyer-anchorage and surroundings including Pulu Pasi Tanette, near the North-point of Saleyer-island. *Cat.* 58 G. formald. $4^{0}/_{0}$. One superior nectophore.

A single superior nectophore of 13 mm. length resembling absolutely *Diphyopsis campanulifera* in its structure and shape was found by the Siboga expedition. The course of the ridges, the serrating of the teeth in the lower part of the nectocalyx, the shape of nectosac, somatocyst, hydroecium, all is identical with the same in *Diphyopsis campanulifera*.

The only difference consists in the course of the canals in the nectosac which for once was very clearly marked. The nectosac itself is of a cylindrical shape, narrowing very suddenly in the upper fourth part of the nectophore and ending in a thin tube-like appendage. The course of the canals is as follows. From the base of the somatocyst a principal canal goes down probably to the base of the nectosac near the velum. This principal canal was not very easily traced.

There it divides itself into four canals, forming first an enlargement such as Chun calls a "Gefässplatte" (**92** p. 93). One of these canals is the ringcanal; it runs along the base of the nectosac, along the velum. Another canal follows the hindwall of the nectosac, goes up to the top, where another (but now a smaller) enlargement is formed and then runs down following the anterior wall of the nectosac towards the velum; it unites at the end with the ringcanal.

Of the two lateral canals the left lateral one runs normally. It begins at the base, gradually leaves the hindwall, gets quite on the lateral wall and bends downwards gradually, a little way beneath the point where the nectosac is narrowing. At its base before uniting with the ringcanal it does not show any enlargement. The right lateral canal shows a very marked difference. Beginning also at the base of the nectosac it goes up following the hindwall, it gradually goes on proximally and some distance beneath the point on the other side, where the left lateral canals bend downwards, we see the development of two circles; the canal seems to divide itself into two, each branch after some time meeting the other. This anastomosing of canals appears again a second time immediately after the first circle. After the formation of the second circle the canal goes on directly to the proximal wall and unites with the dorsal canal. Another branch is sent off from the lower middle-part of the second circle and runs down on the lateral sides of the wall uniting with the ringcanal.

It seems to us that such a development of the lateral canal is only an abnormal case, and that probably the new species will be struck out before long. It is one of the first anomalies of mature Siphonophores which have been found up to this date, as HAECKEL described only abnormal larvae of *Siphonophora* (**69**).

The stem and appendages were well developed; there were three distinct groups in all stages of growth and a young inferior nectophore.

34. *Loose inferior nectophores of Diphyopsinae.* Pl. IX, figg. 71, 72, 73.

Stat. 136. Ternate-anchorage. *Cat.* 80 O. formald. 4°/₀. One superior nectophore.
Stat. 220. Anchorage off Pasir Pandjang, West-coast of Binongka. *Cat.* 77 D. formald. 4°/₀. One inferior nectophore.

Out of the immense material of loose inferior nectophores of *Calycophora* which through bad preservation were utterly worthless, we picked out two tiny slender specimens which through their better preservation and the clear outline of their ridges were interesting enough for description. We tried to find out to which superior nectophores of our *Calcycophorid*-collection they might belong, but of course nothing definite can be said, although we rather incline to find some similarity with *Diphyopsis Weberi.* Looking through the litterature of *Diphyes* and *Diphyopsis*, our attention was drawn to GEGENBAUR's work of 1854 and to BEDOT's of 1896. BEDOT found near Ambon a tiny species which he called *Diphyes gracilis* Ggbr.

We will not discuss the identity of the superior nectophores of BEDOT's and GEGENBAUR's specimens, as we only have inferior ones.

In BEDOT's description we find how he disagrees with GEGENBAUR concerning the identity of *Diphyes gracilis* Ggbr. **54** with *Diphyes acuminata* Lkt. **53** and *Diphyes Sieboldii* Köll. which he gave in a postscript in the same year.

BEDOT finds *Diphyes acuminata* and *Diphyes Sieboldii* identical and he takes *Diphyes gracilis* apart. In the two former species, according to LEUCKART's and KÖLLIKER's description, there exists a true hydroecial canal in the inferior nectophore.

This hydroecial canal is absent in BEDOT's specimens and GEGENBAUR, although he does not speak of any open hydroecial canal, clearly figures (**54** Pl. XVI, fig. 5) how the stem and

appendages come out directly from the proximal part of the inferior nectophore. This implies in our opinion the absence of any hydroecial canal in the nectophore and it makes the identity with *Diphyes Sieboldii* Köll. and *Diphyes acuminata* Lkt. more or less improbable. In Bedot's *Diphyes gracilis* there is no hydroecial canal as the hydroecial canal "est remplacé par une "gouttière formée par les arêtes du nectophore qui, en un point déterminé prennent un dévelop- "pement considérable et donnent naissance à deux lobes se recouvrant l'un l'autre" (**96** p. 371).

He speaks of two lobes and on Plate XII, figure 8 he sketches only one, but as his figure is not very clearly given, it may be that this is a mistake.

Our two loose nectophores show also the development of only one lobe, the continuation of the right wall on the ventral side. This lobe quite covers up the ventral part of the nectophore, on the other side the left wall stands out markedly but a development of a lobe does not appear. We should be willing to identify our two inferior nectophores with Bedot's *Diphyes gracilis* if in the text he had not distinctly said that there are two lobes. A small tooth-like projection is also to be found on the more distal part of the two hindridges. Gegenbaur figures these "Zackenfortsätze", Bedot does not mention them.

But as in Gegenbaur's *Diphyes gracilis* the ventral ridges are of the same length, we see that in our specimens the teeth of the anterior ridges are different. The left is nearly one half longer and projected into a beautifully serrated point. In Bedot's specimen there exists a slight difference in length. Our specimens measure $3^1/_2$ mm. in length, so do Bedot's, whilst Gegenbaur's specimens measure 8—9 mm.

Subfam. Galeolarinae Ch. 97*a*.

The subfamily of the *Galeolarinae* was very interesting as certain species, which had only been found in the northern seas are also represented in the Siboga-material. Unfortunately *Galeolaria* is very delicate and does not stand preservation so well as other *Calycophora*, where the gelatinous substance is more developed and the nectophores have a more facetted appearance. This fails entirely in *Galeolarinae*, they are exceedingly delicate. *Galeolaria quadrivalvis* is perhaps the most substantial of all. The nectosacs which of course in life used to be rounded, are quite flattened by preservation and wherever we found several specimens in one bottle they were so squeezed and altered as to be utterly unrecognizable. So we have been obliged to take no further notice of a great many loose superior and inferior nectophores. It was perfectly useless trying to find out to which species these shapeless things could belong. The species *Galeolaria quadrivalvis* Les. was easily to be distinguished from the others; firstly through the shape of the nectosac in the inferior nectophore, secondly through the course of the canals in the nectosac in both superior and inferior nectophore, and thirdly through the shape of the somatocyst and the appearance of the two lobes near the velum in the superior nectophore.

For the rest of the material we consulted Sars **46**, who writes about two new species *Diphyes biloba* and *Diphyes truncata*, Gegenbaur, who describes **54** *Diphyes turgida* and **60**

Diphyes Sarsii, KEFERSTEIN and EHLERS **61**, who have baptized *Diphyes conoidea* and *Diphyes ovata*, and CHUN **88** who gives a description of *Epibulia monoica*, whilst in **97a** he finds in the collection of the Plankton expedition *Galeolaria truncata* Sars, *Galeolaria biloba* Sars and changes the defective generic name *Epibulia* into *Galeolaria inflata* and *Galeolaria monoica* of 1888.

Of these 8 different specific denominations only 5 ought to remain. First of all *Galeolaria (Diphyes) ovata* Kef. Ehl. is a very remarkable *Calycophorid* and nothing can be said definitely about it, as no other investigator since 1861 has ever found it again.

Galeolaria (Diphyes) turgida Ggbr. must remain if no somatocyst is really to be found in the superior nectophore. If we look at our sketch (Pl. IX, fig. 76) of *Galeolaria monoica* we wonder whether *Galeolaria (Diphyes) turgida* does not possess the same microscopical somatocyst and whether GEGENBAUR has overlooked it. The remaining species *Galeolaria (Diphyes) biloba* Sars **46**, *Galeolaria (Diphyes) Sarsii* Gegenbaur **60**, *Galeolaria (Diphyes) conoida* Kef. and Ehl. **61**, *Galeolaria (Epibulia) monoica* Ch. **88**, *Galeolaria (Epibulia) inflata* Ch. **88** are to be distributed in our opinion among the three species, *Galeolaria biloba* Sars **46**, *Galeolaria truncata* Sars **46** and *Galeolaria monoica* Ch. **88**.

We find with CHUN **97a** that *Galeolaria biloba* Sars and *Galeolaria (Diphyes) Sarsii* Ggbr. **60** are identical. GEGENBAUR speaks of a narrowing of the nectosac near the aperture in the superior nectophore but we do not find any special notice of this particularity either in SARS' figures or text. As far as we can judge both description and figures of SARS and GEGENBAUR are for the rest identical.

Galeolaria truncata Sars is according to us also a very definite species; and we should like to identify with it KEFERSTEIN and EHLERS' *Diphyes conoidea*; there seems to be no difference and we should like to add also CHUN'S *Epibulia inflata*, though there are no figures given and the text is incomplete as to the exact structure of the basal part of the superior nectophore. If ventral lobes are not developed, *Epibulia inflata* is to be considered identical with *Galeolaria truncata* but we cannot find this out, as CHUN'S description is unfinished.

Another difference between CHUN'S and SARS' specimens might be the ventral enlargement in the nectosac of the superior nectophore which according to CHUN appears in *Epibulia inflata* and which if one looks at SARS' figures (Taf. 7, figg. 1, 3) seems not to exist in the species. In the text however we find (**46** p. 42) "Inwendig in diesen Knorpelstücken sind zwei Höhlen, "nähmlich ausser dem so ebengenannten Flüssigkeitsbehälter eine grosse Schwimmhöhle (oder "ein Schwimmsack) die kurzcylindrisch, in der Mitte etwas bauchig gegen das vordere Ende "etwas zugespitzt ist . . . ."

Finally *Galeolaria (Epibulia) monoica* Ch. is a species characterized by the excessive smallness of the somatocyst and "die abweichende Bildung der sogenannten Verschlussklappen "am Schirmrande".

What this deviation in structure is, CHUN does not tell. As we found two superior nectophores which show both characteristics we called it *Galeolaria monoica*, hoping that the structure of the lobes near the velum should happen to be the same as in CHUN'S specimens.

In the Siboga expedition we found besides *Galeolaria quadrivalvis* Less., also *Galeolaria biloba* Sars, *Galeolaria monoica* Ch. and a new species which we call *Galeolaria Chuni*.

Galeolaria Vogt. 54.

35. *Galeolaria quadrivalvis* Les. Pl. IX, fig. 74.

= *Epibulia aurantiaca* Vogt. 51.
= *Epibulia filiformis* Lkt. 53.
= *Galeolaria aurantiaca* Vogt. 54.
= *Diphyes quadrivalvis* Ggbr. 54.
= *Galeolaria filiformis* Lkt. 54.
= *Diphyes quadrivalvis* Kef. et Ehl. 61.
= *Epibulia aurantiaca* var. *canariensis* Ch. 88.
= *Galeolaria quadrivalvis* Ch. 97*a*.

Stat. 99. Anchorage off North-Ubian June 28 and 29 to the West, June 30 to the East of the island. *Cat.* 70 B. alc. 90°/₀. One loose superior, one loose inferior nectophore.
Stat. 117ª. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 F. (2). formald. 4°/₀. 2 loose inferior nectophores.
Stat. 144. Anchorage North of Salomakië-(Damar-)island. *Cat.* 122 G. (2). formald. 4°/₀. 2 loose superior, 2 inferior nectophores.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 F. (1). formald. 4°/₀. One superior nectophore.
Stat. 148. Lat. 0° 17′.6 S., Long. 129° 14′.5 E. *Cat.* 160 A. formald. 4°/₀. One inferior nectophore.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 164 L. (2). formald. 4°/₀. 4 superior nectophores, 2 inferior nectophores, some loose stems and appendages.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.E. (2). formald. 4°/₀. One inferior nectophore.
Stat. 213. Saleyer-anchorage and surroundings, including Pulu Pasi Tanette, near the North-point of Saleyer-island. *Cat.* 58 H. formald. 4°/₀. One inferior nectophore.

The Siboga expedition caught 8 loose superior nectophores, 10 loose inferior nectophores of the well known *Galeolaria quadrivalvis* Les. The species has been especially well described by Vogt under the name of *Galeolaria aurantiaca* and by Gegenbaur as *Diphyes quadrivalvis.* Up to the expedition of the Siboga none were described from the tropical Pacific, excepting perhaps Huxley's *Galeolaria filiformis* of which he found only an inferior nectophore. But it seems that its inferior nectophore did not show the characteristic double narrowing of the nectosac and it is doubtful whether this species is authentically a *Galeolaria quadrivalvis.* Chun too **88** mentions that in the specimens of *Epibulia aurantiaca* of the Canary-islands the characteristic narrowing was less developed. This and a slight difference in the shape of the teeth near the velum distinguish them from e. g. Gegenbaur's specimens. He calls them *Epibulia aurantiaca* var. *canariensis.*

The inferior nectophores of our material all distinctly show the characteristic nectosac of the *Galeolaria quadrivalvis* Les. They do not differ at all from the descriptions given by the other authors.

We give a sketch of one of the best preserved loose superior nectophores, as there was no complete specimen left. In none of these loose superior nectophores is the least trace left of stem and appendages. The gonophores ripen on the stem, they are not detached from it. We found two long stems with many groups of appendages, the ♂ gonophores very

much developed. The length of the superior nectophores varies between $5^1/_2$ and 10 mm., of the inferior nectophores between 7 and 13 mm., one surpasses them all in length; it measures 18 mm.

36. *Galeolaria biloba* M. Sars. Pl. IX, fig. 75.

= *Diphyes biloba* M. Sars 46.

Stat. 50. Bay of Badjo. West-coast of Flores. *Cat.* 166 C.C. formald. $4^\circ/_\circ$. 3 superior nectophores.
Stat. 106. Anchorage of Kapul-island, Sulu-archipelago. *Cat.* 91 E. formald. $4^\circ/_\circ$. One superior nectophore.
Stat. 109. Anchorage off Pulu Tongkil, Sulu-archipelago. *Cat.* 87 E. alc. $90^\circ/_\circ$. 5 superior nectophores.
Stat. 117ª. Lat. 1° 15′ N., Long. 123° 37′ E. *Cat.* 119 E. (I). formald. $4^\circ/_\circ$. 44 superior nectophores.
Stat. 136. Ternate-anchorage. *Cat.* 80 G. formald. $4^\circ/_\circ$. 2 superior nectophores, 2 inferior and *Cat.* 67 B.H. alc. $90^\circ/_\circ$ one superior nectophore of ? *Galeolaria biloba* M. Sars.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 122 G. (I). formald. $4^\circ/_\circ$. One superior nectophore, 4 inferior nectophores.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. *Cat.* 64 F. (2). formald. $4^\circ/_\circ$. One inferior nectophore of ? *Galeolaria biloba* M. Sars.
Stat. 165. Anchorage on North-east side of Daram-island. (False Pisangs), East-coast of Misool. *Cat.* 164 L. (1). formald. $4^\circ/_\circ$. 2 superior nectophores.
Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 E. (2). formald. $4^\circ/_\circ$. 2 superior nectophores.
Stat. 169. Anchorage off Atjatuning, West-coast of New-Guinea. *Cat.* 55 E. formald. $4^\circ/_\circ$. 2 superior nectophores.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 F. (1). formald. $4^\circ/_\circ$. 2 superior nectophores.
Stat. 189ª. Lat. 2° 22′ S., Long. 126° 46′ E. *Cat.* 65 D.F. (1). formald. $4^\circ/_\circ$. One superior, 3 inferior nectophores.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 A.E. (1). formald. $4^\circ/_\circ$. 4 superior nectophores.
Stat. 194—197. (194 = Lat. 1° 53′.5 S., Long. 126° 39′ E. 195 = Lat. 1° 55′ S., Long. 126° 50′.7 E. 196 = Lat. 1° 52′.8 S., Long. 127° 6′ E. 197 = Lat. 1° 45′.3 S., Long. 127° 8′.3 E.). *Cat.* 75 B.B. alc. $90^\circ/_\circ$. One superior nectophore.
Stat. 229. Lat. 4° 23′ S., Long. 128° 45 .5 E. *Cat.* 82 C. formald. $4^\circ/_\circ$. One superior nectophore.

The length of the superior nectophores in the different specimens of *Galeolaria biloba* is extremely varied; we find some from $4^1/_2$—11 mm. length; the inferior nectophores measure from 5—10 mm. They are all more or less damaged by preservation. With Sars' *Diphyes biloba* we identify Gegenbaur's *Diphyes Sarsii*, though in Sars' specimens the gelatinous substance is more developed than in Gegenbaur's *Diphyes Sarsii*. But we do not find this a characteristic difference as in our specimens we found also some difference in the development of the gelatinous substance. Otherwise both Sars' description and Gegenbaur's coincide absolutely with our material. So we distinguished two different kinds of nectophores in them: 1° those whose gelatinous substance is not well developed around the nectosac and whose somatocyst is tolerably large in relation to the whole length of the nectophores and 2° those whose gelatinous substance is well developed and whose somatocyst is comparatively small. In the first case we nearly always found the remnants of a stem and appendages (Pl. IX, fig. 75). Both kinds of nectophores show the characteristic structure in the inferior part near the velum.

On the dorsal side no teeth are developed, whilst ventrally on the proximal side we

see two deeply emarginate lobes which slightly overlap each other. Comparing SARS' figures (Pl. 7, fig. 16) one sees the great resemblance that exists between SARS' specimens and ours. The nectosac is extremely muscular; it has the shape of a Phrygian cap; its top is rounded; ventrally it is somewhat enlarged, so is the gelatinous substance on that side. The canals in the nectosac have the same course as in *Galeolaria quadrivalvis*, that is to say the lateral canals are connected through a small side-canal to the ventral one; this occurs in the posterior third part of the nectosac. The somatocyst is small (about $^1/_6$ of the whole length of the nectophore), it is rounded, of nearly the same breadth over its whole length; in those nectophores where it is more developed, it gets more or less the shape of the somatocyst of *Galeolaria quadrivalvis*.

The stem and its appendages are all broken off and contracted; where some appendages were left, we only found a few buds of which one would be the future inferior nectophore.

In SARS' material the inferior nectophore had probably become detached and a new young one was being developed, as is shown by his sketches. GEGENBAUR **60** describes and figures one; it appears that posteriorly the ventral facet is elongated into two lobes.

Our material also contained loose inferior nectophores, but it was difficult to determine to which species they had belonged. Those which have a nectosac whose canals run like those in the inferior nectophores of *Galeolaria quadrivalvis*, might have belonged to *Galeolaria biloba*, as GEGENBAUR also describes this in his specimens, and in the other species *Galeolaria truncata*, *conoidea* and *inflata* the canals run as in ordinary inferior nectophores of *Diphyopsinae*. They resemble those of HUXLEY's *Galeolaria filiformis*. HUXLEY wrongly identified this inferior nectophore with *Galeolaria quadrivalvis*, but the nectosac does not show the characteristic narrowings. His specimen is closely connected with the inferior nectophores of our material and as his specimen was caught in the Indian ocean it may be that it too belongs to *Galeolaria biloba*.

As to our inferior nectophores belonging to *Galeolaria monoica* nothing positive can be said as CHUN's description does not contain any detail concerning the course of the canals in the inferior nectophore.

37. *Galeolaria monoica* Ch. Pl. IX, figg. 76, 77.

= *Epibulia monoica* Ch. 88.
= *Galeolaria monoica* Ch. 97*a*.

Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 E. (1). formald. 4°/₀. One superior nectophore, length 11 mm.
Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 F. (2). formald. 4°/₀. One superior nectophore, length 11 mm.

CHUN's short and incomplete description of *Galeolaria monoica* given in 1888 permitted us to recognize two characteristics of the species namely the extraordinarily small size of the somatocyst and the complicated structure of the teeth surrounding the velum in two badly preserved superior nectophores of the Siboga material.

The size of the somatocyst is comparatively exceedingly small, (Pl. IX, fig. 76 ± $^1/_{20}$ of the whole length of the nectophore measured from top to the base of the somatocyst) that is to say nearly invisible, and we suppose therefore that GEGENBAUR's *Diphyes turgida* **54** might

stand in some relation to CHUN's *Galeolaria monoica*. As to the complication of the teeth at the basal part of the nectophore CHUN does not give any detail at all, and we are quite in the dark as to what he means. In our two specimens we found the following structure. In Pl. IX, fig. 77 we give a sketch of the lower part of the nectophore seen from the dorsal side, the hinderwall of the nectosac slightly turned upwards. Proximally two lobes are developed, which are of the same length, the right one overlaps the left one so that nearly half of the latter is covered. Opposite on the ventral side, near the hinderwall of the nectosac, are three lobes of an irregular shape, the two lateral ones are larger, especially their outer margin is longer, so that they have an inclined position towards the central odd lobe, which is very much narrower. All three have the pecularity of possessing at their top an irregular swelling which looks as if it had been pasted on the round ends of these lobes. Between the two dorsal and the three ventral lobes are situated laterally two lobes one on each side. These have the shape of an oar beginning as a narrow tube, gradually widening and ending more or less clubshaped. These lateral lobes are twice as long as the dorsal ones. In our figure they are bent towards the interior of the nectosac, probably through contraction by preservation. We wonder whether CHUN's "abweichende Bildung" has some resemblance to our structure of the basal part of the nectophore.

The canals in the nectosac were entirely invisible through bad preservation.

No trace of stem and appendages or inferior nectophore was to be found.

38. *Galeolaria Chuni* nov. spec. Pl. IX, figg. 78, 79.

Stat. 168. Anchorage North of Sabuda-island. *Cat.* 97 E. (3). formald. 4°/₀. 2 superior nectophores.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 39' E. *Cat.* 23 A.E. (3). formald. 4°/₀. One superior nectophore.

The three superior nectophores of this new species measure 4, $4^1/_2$, $3^1/_2$ mm. They are the smallest *Galeolarinae* which have been found up to this date.

They differ from *Galeolaria biloba (Sarsii)* and *monoica* in the course of the canals which is as in *Diphyopsinae*, the lateral canals not standing in any connection with the ventral one and they differ from *Galeolaria truncata* in the presence of two small lobes (Pl. IX, fig. 79) at the ventral posterior part of the nectophore, whilst any resemblance to CHUN's *Galeolaria inflata* cannot be made out as his description **88** is insufficient. A difference between the two can be found in the length of the somatocyst which in *Galeolaria inflata* attains $^1/_3$ of the whole length of the nectophore, whilst in *Galeolaria Chuni* it surpasses half the length. The somatocyst is very much developed, narrows gradually towards its base; its superior third part runs closely near the hinderwall of the nectosac.

No trace of stem or appendages was to be found.

Fam. POLYPHYIDAE Chun 82.

Subfam. Hippopodiinae Köll. 53.

Hippopodius Quoy et Gaimard.

39. *Hippopodius luteus* Q. et G. Pl. IX, fig. 80.

= *Gleba excisa* Otto 23.
= *Hippopodius luteus* Q. et G. 27.
= *Hippopodius luteus* Eschsch. 29.
= *Stephanomia hippopoda* Q. et G. 33.
= *Elephantopus neapolitanus* Less. 43.
= *Hippopodius neapolitanus* Köll. 53.
= *Hippopodius luteus* Vogt 54.
= *Hippopodius gleba* Lkt. 54.
= *Hippopodius gleba* Kef. et Ehl. 61.
= *Hippopodius luteus* Ch. 88.
= *Hippopodius gleba* Hkl. 88*a*.
= *Hippopodius luteus* Ch. 97*a*.
= *Hippopodius hippopus* Schneider 98.

Stat. 141. Lat. 1° 0.4 S., Long. 127° 25'.3. *Cat.* 44 D. formald. 4°/₀. 2 loose nectophores.
Stat. 148. Lat. 0° 17.6 S., Long. 129° 14'.5 E. *Cat.* 161 C. formald. 4°/₀. 2 loose nectophores and *Cat.* 37 B. alc. 90°/₀. 5 loose nectophores.
Stat. 185. Lat. 3° 20' S., Long. 127° 22'.9 E. *Cat.* 49 B. formald. 4°/₀. 2 complete specimens, 4 loose nectophores.
Stat. 217. Lat. 6° 40'.6 S., Long. 123° 14'.7 E. *Cat.* 168 A. formald. 4°/₀. 2 loose nectophores.
Stat. 225. 5700 M. N. 279° E. from South-point of South Lucipara-island. *Cat.* 146 B. alc. 90°/₀. 3 loose nectophores.
Stat. 243. Lat. 4° 30'.2 S., Long. 129° 25' E. *Cat.* 158 A. formald. 4°/₀. 3 loose nectophores, one of them with appendages.
Stat. 276. Lat. 6° 47'.5 S., Long. 128° 40'.5 E. *Cat.* 105 A. formald. 4°/₀. 7 loose nectophores.

Of *Hippopodius luteus* we can only give a sketch of one of the 30 loose nectophores which occurred in the material of the Siboga. It will be seen that it does not differ at all from the Atlantic and Mediterranean species.

It seems a pity that no more complete specimens were found, especially as the alcohol ones were very much altered. Altogether the material is not interesting.

The nectophores measured from 5—15 mm. in length.

CHAPTER II.

II. Ordo PHYSOPHORA Eschsch. 29.

I. Legio HAPLOPHYSAE Ch. 88.

Subordo PHYSONECTA Hkl. 88a.

Fam. FORSKALIDAE Hkl. 88a.

Forskalia Köll.

40. *Forskalia contorta* M. Edwards. Pl. X, fig. 81; Pl. XI, fig. 84.

= *Stephanomia contorta* M. Edwards 41.
= ? *Stephanomia prolifera* M. Edwards 41.
= *Apolemia Edwardsii* Less. 43.
= ? *Apolemia prolifera* Less. 43.
= *Stephanomia contorta* Lkt. 53.
= *Forskalia ophiura* Lkt. 54.
= *Forskalia formosa* Kef. & Ehl. 61.
= *Forskali ophiura* Kef. & Ehl. 61.
= *Forskaliopsis ophiura* Hkl. 88*b*.
= *Forskalia ophiura* Ch. 88.
= *Forskalia contorta* Bedot 93.

Stat. 143. Lat. 1°4'.5 S., Long. 127°52'.6 E. *Cat.* 114. formald. 4°/₀. One specimen.
Stat. 185. Lat. 3°20' S., Long. 127°22'.9 E. Manipa-strait from 1536 M. to surface. *Cat.* 165 B. formald. 4°/₀. One specimen.

The family of the *Forskalidae* is one of the most complicated as to the systematic nomenclature and it was BEDOT **93** who tried to introduce order into the chaos. He tried to find some characteristic by which he could distinguish the species one from the other and he chose the presence or absence of pigment-spots in the nectophores and their relative position in these structures.

There are hardly any *Siphonophores* known which change so entirely in the preserving fluids. We had the opportunity of observing in Naples beautiful living specimens of *Forskalia Edwardsi* Köll. and *Forskalia Leuckartii* Bedot. When quite fresh, they possess all their appendages and it is a fine sight to watch the graceful movements of one of the complete

specimens of *Forskalidae.* But a slight touch against the glass in which they are swimming about, immediately causes them to lose quantities of appendages, especially bracts and nectophores. After some time more and more appendages detach themselves. On one occasion we have added to the seawater a small quantity of formaldehyd 4°/₀ in one basin, of alc. 90°/₀ in another. The effect was instantaneous; the two complete *Forskalia* instantly dropped all their bracts and nectophores, the greater part of the siphons, tentacles, palpons, gonophores followed and there remained nothing at the bottom of the glass of these wonderful specimens of several centimeters in length but a tiny, whitish structure. This consisted of the pneumatophore, a few buds of nectophores and the entirely contracted stem with a few buds of appendages, the whole only measuring a few mm.

This taught us what we had to expect from the Siboga material as we knew that with only a few exceptions all the *Siphonophores* were immediately put into alcohol or formaldehyd. And a great many *Forskalidae* only consisting of the appendages mentioned above were found; they could not be determined. Some others had a few more appendages, they consisted of parts of better preserved specimens and again a few were just sufficiently well-preserved to be compared with the *Forskalidae* described by former authors.

We could identify two specimens with *Forskalia contorta* M. Edw. (Cat. 114 and Cat. 165 B.) one of which was sketched (Pl. X, fig. 81).

That it is a *Forskalia* is easily recognized by the several mature nectophores situated in a spiral row around the stem and by the side branches of the stem, the pedicles of the siphons. These are the two characteristics by which we identified these two specimens of *Forskalia.* For the determination of the species we thought of *Forskalia contorta* as the shape of the nectophores is absolutely the same as M. Edwards gave in his very clear work in 1841. The characteristic given by Bedot of the absence of any pigment near the canals of the nectophore unfortunately applied to all our *Forskalidae*, as they had probably lost all their pigment-spots through the preserving fluids and not the least trace could be found of them. But there were other differences in structure by which the other *Forskalidae* could be determined.

The length of Cat. 114 (Pl. X, fig. 81) is about 15 mm. measured from the top of the most proximal nectophore to the aperture of one of the most distal siphons; the greatest breadth of the nectosome is 10 mm., the length of the nectosome or the place for the implantation of the nectophores on the stem is 3 mm.; the distance of the youngest siphon and the eldest siphon is about 10 mm. The pneumatophore (Pl. X, fig. 81) is shapeless, it seems to be damaged by preservation.

The nectosome (Pl. X, fig. 81) is very much contracted through preservation as there are only seven mature nectophores left. These are well developed; the nectosac is especially broad at its base, the two wings on each side well-developed. The aperture is broad too, nearly one third of the whole breadth of the nectosac.

The gelatinous substance never exceeds to any extent the outer wall of the nectosac; it has no winglike expansions as is the case in *Forskalia formosa.* At the base of the canal of the nectosac are two curved blind branches of the same, which were also described by former authors. The canals in the nectosac itself were clearly to be seen.

Of the entirely altered siphosome only six siphons are left, a few palpons, tentacles and tentilla and gonostyles with immature gonophores.

The stem of the siphosome is absolutely contracted; therefore exceedingly muscular. All the different side-branches with or without siphons are now situated close to one another. The siphons show clearly their villi; the tentilla consist of one spiral cnidoband, built of two kinds of cnidocysts, ending in a filament consisting of a multitude of small cnidocysts (Pl. X, fig. 84).

It should be borne in mind that figures such as those given for preserved material give an absolutely different impression of *Forskalia* when alive.

41. *Forskalia Edwardsi* Köll. Pl. X, figg. 82, 83.

= *Forskalia Edwardsii* Köll. 53.
= *Stephanomia contorta* Vgt. 51.
= *Apolemia contorta* Vgt. 53.
= *Forskalia Edwardsii* Kef. Ehl. 61.
= *Forskalia Edwardsii* Cls. 63.
= ? *Forskalia atlantica* Fewk. 82.
= *Forskalia Edwardsii* Hkl. 88*b*.

Stat. 136. Ternate-anchorage. *Cat.* 215 J. formald. 4°/₀. One specimen of ? *Forskalia Edwardsii* Köll.
Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 46, 171, 181, 182, 183, 184, 185, 186, 187. formald. 4°/₀. 9 specimens.

The 9 specimens belonging to the same station are all comparatively in the same state of preservation; their length, measured from the pneumatophore to the aperture of the eldest siphon, varies from 1—2 cm., their breadth from 4—5 mm.

They are not absolutely colourless, as the pigment-spots in the upper part of the pneumatophore are well-developed. Unfortunately the pigment near the canals in the nectosac has been destroyed, owing to the influence of the preserving fluids.

We give a sketch of Cat. 183 (Pl. X, fig. 82) which shows that a great many more appendages are left than in *Forskalia contorta*. Through contraction, however, every appendage has lost its natural place on the stem. That is why the general appearance as is given in Pl. X, fig. 82, is such a very singular one. The nectosome has surely been much longer, as its stem is very broad and muscular and we saw in the living specimens how it may become nearly thread-like.

The nectophores are wedge-shaped, a characteristic of *Forskalia Edwardsi*; this is to be seen in the other specimens, the mature nectophores absolutely failing in Cat. 183. The canals of the nectosac are clearly seen.

The pedicles of the siphons are in some specimens not quite contracted, the original rounded shape of the siphosome in preserved specimens therefore does not differ so much from living ones. Many palpons, a few bracts are scattered between the other appendages on the stem. A few bracts are still well-preserved and have the same shape as Kölliker describes **53**. The tentilla and their tentacle are also present in great number; they do not differ from those in *Forskalia contorta*.

Female and male gonophores on their gonostyles and gonopalpons are present in all stages of development.

Cat. 215 J (Pl. X, fig. 83) is a specimen which through contraction has lost more of its appendages than those of Stat. 165. It resembles therefore in this respect more the *Forskalia contorta* of the Siboga material. It shows again how *Forskalia* changes through preservation.

Some specimens of *Forskalidae* were entirely unrecognizable through the absence of the most necessary appendages.

They belong to:

Stat. 136. Ternate-anchorage. *Cat.* 71 C.D.E.G. alc. 90°/₀. 4 specimens.
Stat. 186. Lat. 3° 10'.5 S., Long. 127° 20'.5 E. *Cat.* 25 U. One specimen.
Stat. 189ª. Lat. 2° 22' S., Long. 126° 46' E. *Cat.* 127 E. alc. 90°/₀. One siphon.
Stat. 205. Lohio-bay, Buton-strait. *Cat.* 50 A. alc. 90°/₀. One specimen.

Erenna Bedot.

42. *Erenna Bedoti* nov. spec. Pl. XI, figg. 85—90.

Maurice Bedot describes in his "Siphonophores provenant des campagnes du yacht "Princesse Alice (Monaco 1904)" tentacles of a *Siphonophore* apparently unknown up to that date which he called *Erenna Richardi*. The fragments he found are not sufficient to his opinion to give *Erenna* a definite place in the system but he thinks it not improbable it belongs to the order *Physophora (Physonecta)*. We found in the Siboga material a specimen which possesses tentacles resembling those of *Erenna Richardi*. We therefore called this only specimen *Erenna*, using a new specific denomination "*Bedoti*" as of course we cannot decide whether the tentacles described by Bedot belonged to a specimen entirely identical with ours.

Provisionally we place *Erenna* with the *Forskalidae*.

The sketch of the whole specimen (Pl. XI, figg. 85, 86) is perhaps somewhat difficult to understand. We found first of all that the nectostem with its pneumatophore and buds of nectophores, had broken off from the siphosome. It surely belongs to the same specimen and we suppose therefore the lower part of the nectosome *a* (Pl. XI, fig. 85) to have been attached to *a'* (Pl. XI, fig. 86) in the siphosome.

The pneumatophore (Pl. XI, fig. 85) has a length of 4,5 mm., a breadth of 2,5 mm. It is transparent, shows a small brownish-red pigment-cap at the top and 8 longitudinal white stripes. Its colour is whitish, the stripes are opaque white. In the immediate neighbourhood on a muscular elevation of the nectostem are imbedded eighteen buds of nectophores in different stages of development. They are very particularly characterized through the presence of black granulations which follow (or are contained in ?) the radial and circular canals. Of the largest of these nectophores we give a sketch (Pl. XI, fig. 87). The substance of the nectophore is opaque greyish-white; the black stripes are particularly clear in the two median longitudinal lines and in the basal part of the nectosac, where the line following the side parts of the nectosac sends on both sides a short canal which stops abruptly. These black granulations are also to be found in other appendages, of which we will speak later and they constitute one of the characteristics of *Erenna*. They have never been described in other *Siphonophores*.

The nectosome to the broken end (*a*) has a length of 2,5 cm.; is strongly muscular, gets narrower some distance underneath the pneumatophore; (5 mm.) from that point it widens gradually (5—10 mm.) and gets its original breadth again after 8 mm. On this widest part we find many longitudinal furrows and ridges; the nectostem is very muscular. On the side where the greatest amount of nectophores are being developed, we find the same muscular elevations which in other *Physonecta* are the indications of detached nectophores. Although all these muscular off-shoots are situated in one continual longitudinal line (in the sketch this line is interrupted, there where the nectosome is broadest, but as they continue somewhat more to the opposite side from that shown in the sketch, they have not been added) the nectophores probably do not develop in one line. This we found also in *Crystallomia* and other *Agalmidae* and is therefore a quite generally occurring phenomenon. It is very difficult to give an exact description of all the appendages and of the position on the common stem, many being lost, the siphosome showing many contortions.

In Pl. XI, fig. 86 they are sketched in their natural position; the sketch shows the specimen as it was taken by the Siboga expedition.

We suppose *a'* to correspond with *a* in Pl. XI, fig. 85, so *a'* is the most proximal part of the siphosome and in this part the sketch is partly hidden by the most distal part of the siphosome which is entirely covered by numerous appendages, the description of which will follow.

The first 15 mm. of the siphosome (or is it the distal part of the nectosome?) is devoid of any appendage; the muscular elevations are well-marked on one side of the 5 mm. broad strongly muscular stem. The stem itself shows annular constrictions and a multitude of longitudinal furrows over its whole length.

Then after these 15 mm. we find a first gonodendron, its gonostyle having already attained a length of 7 mm. It shows proximally well-developed gynophores; the most distal ones are the largest in size. The black granulations are visible in the gonostyle, and the black colour of the gonostyles contrasts quite clearly with the whitish gynophores.

Five mm. further on another gonodendron is found attached in the transverse furrow formed by one of the constrictions. One gonopalpon of the length of 3 mm. is found attached to it. In the immediate neighbourhood of this second gonodendron we find a slender palpon of 3 mm. length which seems to be attached immediately to the stem. It may be, however, that the distal part of the gonostyle is still present though very short and that this palpon is attached to it and should therefore be a gonopalpon. Distinctly attached to the siphosome is a 3 mm. long foliaceous bract the structure of which we will describe further on.

At a distance of 7 mm. from this young bract we find another gonodendron, which is larger and better developed than the two first ones. There are two gonopalpons attached to the gonostyle of which one (α) is figured. Those situated on the right and left side belong to another gonostyle. This time the palpon (α) has attained a length of nearly 6 mm. It shows a very peculiar structure which is more clearly seen in the two other palpons. Its entodermal layer shows elongate *S*-shaped spots, which show as transparent worm-like blots on the also transparent background. These spots are present on the whole surface except for the basal part of the palpons which is a restricted muscular pedicle, and for its apex, which is sharply pointed

and is also very muscular. A further peculiarity in the structure of these palpons is the appearance of black granulations near the top which is clearly indicated in all palpons; it is not clear to us whether we have here the same granulations as in the buds of nectophores. We thought it better not to make any sections having had the experience when making sections of the tentilla that the tissues in this specimen are entirely destroyed and as only very few palpons remain, we left the specimen as we received it.

In some gonopalpons (in *l*) we found moreover a kind of black string-like structure in the interior second part. In this case the gonopalpon shows division into three distinct parts, the pedicle, the middle part and the apex.

The other palpons sometimes show no division at all, sometimes only one constriction. This shows that the constriction is probably only a momentary muscular contraction.

The black string-like structure seems to us to represent also an accumulation of black granulations. It is not clearly indicated in the sketch, this palpon not being quite transparent and the granulations being situated nearer to the opposite wall of the gonopalpon.

The gonostyle with its only palpon α is opposite to the gonostyle which possesses the three gonopalpons 1, 2, 3 of which we have spoken and at a distance of 3 mm.

Not only does the nectosome show muscular elevations, where nectophores have been attached to it. We find the same in the siphosome and as they are very numerous, the appendages as far as they are not lost, seem sometimes to stand more or less opposite to each other. We suppose however that the siphosome whose muscles are immensely developed, is very much contracted and that in the living state the stem certainly attained a much greater length.

The appendages which follow now are so irregularly scattered along the stem, that we cannot assign a definite place to them. We will therefore only mention them indicating also those which are not drawn on Pl. XI, fig. 86 as they are situated behind the appendages drawn on that figure.

First of all we find a great amount of small blackish gynophores which are probably the remaining ova of gonodendra in which the older gynophores have already detached themselves from the gonostyle. In front of them are attached four young undeveloped foliaceous bracts. Then comes another gonodendron with young gonophores to which only one gonopalpon is attached. Underneath the four buds of bracts we find a siphon, or only part of one, the proximal parts having been lost, and also the basal one remaining attached with its broad base to a prominence of the siphosome, which being very short can hardly be said to be a peduncle. This basal part has a strongly muscular wall, somewhat contracted and shows interiorly a great quantity of black-coloured hepatic villi, which through the contraction of the outer wall do not show any regular disposition. Situated immediately next to this siphon we find an immensely broad tentacle (*t*), of which also the basal part has remained. This tentacle reminds one exactly of the tentacle described by Bedot and figured on fig. 1 and 6 **1904**. It is, as in *Erenna Richardi*, divided into segments and shows circular incisions at regular intervals, the whole connected by a thin membrane, the "crête longitudinale". In our specimen the incisions show perhaps less clearly but the tentacle is very much contracted and swollen; it shows two spiral windings and at its base opposite the side which was drawn,

we find the very first indications of tentilla as small elongate buds, placed closely one next to the other. (Pl. XI, fig. 88).

These young tentilla are very much clearer in the second and last tentacle, which is situated about 10 mm. from its predecessor also at the base of an incomplete siphon, of which again only the basal part, the strongly muscular wall has remained.

This tentacle is broader, whiter and larger than the younger one and shows better the segmental incisions. Some of its tentilla are situated on the other side, others we detached ourselves to get a clearer idea of their structure. The tentacle with the remaining tentilla is sketched on Pl. XI, fig. 88; the specimen has been turned upwards somewhat to make the tentilla stand out more clearly. We now distinguish on the left side of this drawing the most mature tentillum which reminds one at once of the tentilla described by BEDOT. Another, larger one, is sketched on Pl. XI, fig. 89. They recall BEDOT's figures. It is as in the tentilla of BEDOT's *Erenna Richardi* divided into a pedicle (Pl. XI, fig. 89 *pti.*), a middle part (*mpti.*) of which the upper half consists of the black-granulated "appareil urticant" (*cpti.*), and the apex (*apti.*), in which BEDOT, moreover, found a strange apparatus, two paired ocelli ("organes de l'appendice terminal"); these are only just beginning their development as a small black spot situated near the apex, but we find it more in the neighbourhood of the crest than of the apex of the tentillum. This shows probably that the tentillum is not a full-grown one. The "bourrelet de nématocystes" in BEDOT's *Erenna Richardi* is the proximal part of the granulated crest, which does not stand in connection with the entodermal canal of the middle-part. In our largest tentillum we find it on the contrary near the basal part; near the peduncle of the tentillum. Perhaps such another "bourrelet" is being developed in later stages.

Microscopical sections have been made but the material is unfortunately absolutely insufficient, the different layers being all destroyed. We can therefore give no further description of the very interesting entodermal canals and paired organs which BEDOT describes, nor of the "cellules transparentes" and the relation all these layers bear one to another.

However incomplete the description of these tentilla is, there exists undeniably the closest relationship between the tentacles and tentilla of *Erenna Richardi* and *Erenna Bedoti*. The resemblance of the tentacles of these two to those in the new species, *Bathyphysa Sibogae*, is also a striking one (compare Pl. XI, fig. 88 and Pl. XXIII, fig. 163). Finally we give as ketch of a mature bract, which whilst examining the specimen, became detached. It has a length of 18 mm., a breadth of $2^1/_2$ mm. (Pl. XI, fig. 90). It can be divided into two distinct parts, the basal one which is excavated and rounded anteriorly, the proximal one which arises somewhat higher and finishes gradually in a blunt point. This second part shows a small indentation which is probably also situated on the other side, but was lost. The cartilaginous substance is not very consistent, there are no ridges, nor is any part of the bract serrated. The canal of the bract goes right through the median part of the gelatinous substance.

Fam. AGALMIDAE Brandt 35.

Agalma Brandt.

43. *Larva of Agalma* spec. Pl. XIII, fig. 97.

Stat. 118. Lat. 1° 38 N., Long. 124° 28'.3 E. *Cat.* 157 A. formald. 4°/$_0$. One specimen.

This single specimen of an *Agalma* is exceedingly small, the diameter of the very rounded little specimen being about one mm. and it is very remarkable that magnified about 25 times (Pl. XIII, fig. 97) we find that not only the pneumatophore is well-developed but at the same time we find three buds of nectophores in different stages of development, two siphons, one tentacle with tentilla and three well-developed palpons; all the appendages are situated closely packed together. It was the shape of the uniform tentilla, well-known in the larval stages ot *Agalma*, which made us identify this specimen with that genus. They are of considerable size in comparison with the whole specimen.

Our specimen bears a great resemblance to LEUCKART's larva of *Agalma Sarsii* (**53** p. 39). But he found only one siphon and the diameter of the larva was $1^1/_2$ mm.

So the specimen of *Agalma*-larva of the Siboga expedition is the smallest and most compact one that has ever been found.

Mature *Agalma* were entirely absent from our material.

44. ? *Young Agalmopsis* M. Sars.

Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 136 A. alc. 90°/$_0$. One specimen.

No example of an *Agalmopsis* identical with any of the species of SARS, as defined by later authors, was found by the Siboga. An absolutely incomplete specimen, entirely altered by preservation, of a total length of 4 mm. might perhaps be reckoned to this genus. The shape of the unique bract, namely, an elongate, foliaceous one, with three small groups of cnidocysts at the three terminal points, shows a certain resemblance to the bracts of *Agalmopsis*.

The specimen consists of a badly preserved pneumatophore, three hardly recognizable mature nectophores and a siphosome with no other appendages than the above-mentioned young bract.

Genus **Crystallomia** Dana 58.

BEDOT (95) finds nine species of *Agalmidae* identical with DANA's *Crystallomia polygonata* **58**. These are:

Agalma Mertensii Brandt **35**,
Agalma Okenii Ggbr. **60**,
Crystallodes rigidum Hkl. **69**,
Agalma Okenii Fewk. **83**,
Crystallodes rigida Hkl. **88a**,
Crystallodes vitrea Hkl. **88a** and **88b**,
Crystallodes Mertensii Hkl. **88a** and **88b** and
Agalma rigidum Bedot **88**.

How far this synonymy is valid, we cannot decide. Bedot had the opportunity of seeing many living specimens of *Crystallomia* near Amboina **95** but he does not give any details of their structure. Mertens' figures of *Agalma Okenii*, which Brandt called *Agalma Mertensii* **35**, were not published, and we have had no opportunity of seeing the original drawings. Judging from the shape of the bracts, such as Dana **58** describes, Gegenbaur's fragments of *Agalma Okenii* **60** and Fewkes' complete specimens of the same also belong to *Crystallomia polygonata* Dana. We quite agree with Bedot, that Haeckel's new generic denomination *Crystallodes* **69** ought to be dropped. When we compare both text and figures, no generic differences can be noticed between the two. We hesitate to decide whether all the three species of Haeckel: *Crystallodes rigida*, *vitrea* and *Mertensii* actually belong to *Crystallomia polygonata*.

All the specimens of *Crystallomia* above-mentioned were described from beautiful complete specimens, probably drawn and described after life.

Preservation — even in formaldehyd 4°/₀ — is very unfavourable for giving an exact idea of the structure of *Agalmidae*. Our sixty-eight specimens from the Siboga expedition are all more or less incomplete; sometimes the appendages fail, and the exterior of the specimens changes especially through the contraction and torsion of the stem. In some specimens the nectosome is entirely contracted, the nectophores having fallen off, and then the siphosome is better preserved, and very often we find that the contrary is the case.

We could not possibly make any drawings such as Dana **58** and Haeckel **69** and **88b** give of complete examples of *Crystallomia*.

Moreover our 68 specimens are much smaller, the smallest measuring $1^1/_2$ mm., the largest a few centimeters. A complete list of the different size of the specimens we give in each group apart.

This was one of the reasons, why ever since beginning of our examination of the *Agalmidae*, we doubted whether it would be possible to bring our smaller specimens into connection with the species already known.

We therefore do not wish to give any definite specific denomination but divide our specimens into two groups, called *Crystallomia* spec. group I and *Crystallomia* spec. group II. They all possess at least one characteristic which also belongs to *Crystallomia* Dana. We are convinced that even this division into two groups will not be a lasting one, but that investigators with more complete and especially living material, will subdivide them and by accurately comparing their material with our publication will be able to introduce definite specific denominations. The division into two principal groups is based solely on the shape of the tentilla.

On superficially comparing our sketches (Pl. XII, Pl. XIII, Pl. XIV, Pl. XV) with the publications of Dana **58**, Gegenbaur **60**, Haeckel **69** and **88b** one would not at first sight find any difference between them. We find, however, that there are many differences. The material of the Siboga expedition taught us how all the different tentilla such as the above-mentioned authors describe, are represented in the Siboga material and we have even to describe two other new different kinds of these appendages which occur in different specimens and during special periods of development.

Of great importance is the total absence in all 68 specimens of the kidney-shaped tentilla, which have been described in other *Agalmids* by LEUCKART **54**, VOGT **54**, KEFERSTEIN and EHLERS **61**, CLAUS **63**, METSCHNIKOFF **74**, FEWKES **81**, **82**, in *Crystallodes* by HAECKEL **69**. These tentilla are sometimes provided with bristles. HAECKEL **69** describes how these kidney-shaped tentilla gradually grow into the tentilla with two lateral filaments and a median lobe. He even sketches a tentacle (tentacle of a larva of the 27th day) where one sees the slow gradation from one type to the other. This development of tentilla has never been found by other authors, either in *Crystallomia* or in any other *Agalmid*. They always find that the kidney-shaped tentilla develop first and that next to these another tentacle with trifid tentilla appears. KEFERSTEIN and EHLERS even describe how they found small *Agalma Sarsii* (3 mm.) where the only siphon already showed the development of a tentacle with trifid tentilla. They are also the very first authors who give expression to the idea that the primary siphon may have fallen off.

They say:

"Wir möchten nach diesen Beobachtungen uns der Vermuthung LEUCKART's anschliessen, "dass manche Siphonophoren in der Jugend andre Nesselknöpfe produciren als später, und dass "wenn zweierlei Formen Nesselknöpfe vorkommen, man bei den älteren Polypen die Jugend-"formen trifft während die jüngeren schon die endgültigen tragen".

CHUN **88** first thought with HAECKEL that the tentilla of the primary tentacle developed directly into those with terminal filaments and median lobe. He finds however that these are not the definite ones, as in more advanced specimens of *Crystallodes* the tentacle of the oldest siphon was still provided with the well-developed tentacle and trifid tentilla. These tentilla, however, do not reach half the size of the definite tentilla. We too have found again this difference in size.

We distinguish four types of tentilla, of which type I (Pl. XIII, fig. 98) is the smallest, somewhat larger is type II, (Pl. XIII, fig. 99, 100), the third in size is type III, (Pl. XIII, fig. 101), the largest are the tentilla of type IV (Pl. XIII, fig. 102).

Group I of *Crystallomia* spec. is, as far as the tentilla are concerned, an absolutely rounded group. Group II comprises specimens which diverge mutually, it is true, but which in the main points show conformity.

A detailed description of the tentilla is given in each group.

Crystallomia Dana 58.

45. *Crystallomia* spec. group I. Pl. XI, fig. 91; Pl. XII, fig. 92—96; Pl. XIII, figg. 103, 104.

Stat. 86. Anchorage off Dongala, Palos-bay, Celebes. *Cat.* 53. formald. 4°/₀. One specimen.
Stat. 136. Ternate-anchorage. *Cat.* 24 A., 24 D., 24 F., 71 A., 71 B., 88 E., 88 F., 88 K., 88 L., 88 M., 88 N., 88 P., 151 C., 151 D., 151 F., 151 H., 175 C., 175 D., 175 F., 176 H., 215 A., 215 L. formald. 4°/₀. 21 specimens.
Stat. 141. Lat. 1°0'.4 S., Long. 127°25'.3 E. *Cat.* 223. formald. 4°/₀. One specimen.
Stat. 144. Anchorage North of Salomakiëe-(Damar-)island. *Cat.* 163 A., 163 B., 163 C., 163 D. formald. 4°/₀. 4 specimens.

Stat. 172. Gisser; anchorage between this island and Ceram Laut. *Cat.* 42 G. formald. $4^{\circ}/_{0}$. One specimen.

Stat. 180. Lat. $3^{\circ}\,10'.5$ S., Long. $127^{\circ}\,26'$ E. Northside of Manipa-strait. *Cat.* 25 A., 25 B., 25 E., 25 H. formald. $4^{\circ}/_{0}$. 4 specimens.

Stat. 205. Lohio-bay, Buton-strait. *Cat.* 154. formald. $4^{\circ}/_{0}$. One specimen.

Stat. 282. Lat. $8^{\circ}\,25'.2$ S., Long. $127^{\circ}\,18'.4$ E. Anchorage between Nusa Besi and the N. E.-point of Timor. *Cat.* 51 A. alc. $90^{\circ}/_{0}$. One specimen.

Cat. N°	primary siphon	2d siphon	3d siphon	4th siphon	5th siphon	6th siphon
176 H.	I					
163 D.	I					
71 B.	I					
51 A.	I					
71 A.	I	III				
163 A.	I	III				
25 H.	I	III				
25 E.	I	III				
42 G.	I	III				
151 H.	I	III IV				
151 F.	I	III IV				
151 C.	I	III IV				
215 L.	I	III IV				
163 B.	I	III IV				
88 L.	I	III IV				
25 B.	I	III IV	3♂?			
151 D.	I	III IV	III IV			
175 D.	I	III IV	III IV			
175 C.	I	III IV	III IV			
24 A.	I	III IV	III IV♀			
88 E.	I	III IV	III IV♀			
25 A.	I	III IV	III IV♀			
88 F.	I	III IV	III IV♀	III IV♀	III IV♀	
88 M.	ab I	III IV	III IV			
24 D.	—	III IV	III IV			
88 K.	—	III IV	III IV			
163 C.	—	III IV	III IV			
88 N.	—	III IV	III IV			
88 P.	—	III IV	III IV			
215 A.	—	III IV	III IV			
223	—	IV	IV			
175 F.	—	IV	IV			
53	—	III IV♂	III IV♂	III IV♂		
154	—	IV III	IV III	IV	IV	IV
24 F.	—	IV? abnormal.				

The first group of *Agalmids*, provisionally called *Crystallomia* spec. group I consists of 34 specimens of which 32 belong to the same station.

The youngest one (Cat. 176 H.) has a length of $1^{1}/_{2}$ mm. measured from the top of the pneumatophore to the aperture of the only, primary siphon. The size of the specimens gradually increases, till we get the specimen Cat. 88 F. which has a total length of 12 mm. A very much

older one (Cat. 53) has a length of 15 mm., of which 5 mm. is reckoned for the nectosome, 10 mm. for the siphosome.

The table given above shows first all the Catalogue-numbers in one column, then the amount of siphons, as they develop themselves on the stem, the primary siphon being the oldest, the second siphon coming next and so on. The Roman numerals indicate the kind of tentilla which accompany the siphon in the same column. We will describe the four types of tentilla further-on.

The first specimen *Cat. 176 H.* could not be figured as it had undergone too much alteration by preservation. It consists of a small pneumatophore which is colourless, a few buds of nectophores, one primary siphon, situated nearly immediately below the pneumatophore, necto- and siphosome being hardly differentiated. At the base of the siphon is a group of tentilla, which are still very young. Some palpons and other buds are already developed.

The next *Cat. 163 D.* (Pl. XI, fig. 91) is better preserved. (Length: top of the pneumatophore to aperture of the siphon $3^1/_2$ mm.). The pneumatophore is damaged, the top is slightly pigmented. One bud of a nectophore (*n*) is already much developed, as we see the gelatinous substance developed on both sides. Other buds of nectophores (*bn*) are smaller and not yet differentiated. The nectosome and also the siphosome are hardly distinguishable one from the other; this shows how very young our Cat. 163 D. is. The greater development of the nectophores in such young stages shows a difference from the larva of *Crystallodes* described by Haeckel **69**. These possess already a few mature bracts before the first nectophore is to be seen.

The primary siphon (*prs*), the very oldest one, lies immediately underneath the pneumatophore. It is mature and bears at its base a group of very young tentilla. They are similar to those of Cat. 25 A. which we sketched (Pl. XII, fig. 92). These tentilla belong to *type I*, they are the smallest; they are situated in a great number near the base of the stem. We never saw any tentacle fully extended; it probably lies quite coiled together and hidden beneath the pedicles of the tentilla. The tentillum itself consists of a certain number of big cylindrical, elongated spindle-shaped nematocysts; one and a half or two turns of the cnidoband, the whole surrounded by a closed involucrum and of the characteristic lateral filaments and median lobe. All the different parts of this tentillum are very tiny and fragile, the lateral filaments are never curled up. These tentilla of type I are not identical with those drawn by Dana **58** and Haeckel **69** and **88b** and other authors do not describe them.

Cat. 163 D. shows furthermore four mature palpons with their palpacles.

The following numbers *Cat. 71 B.* (Pl. XII, fig. 96) and 51 A. are somewhat larger. The pneumatophore is very much developed, and shows the most beautiful pigmentation towards its top, the purple stripes issuing on the lateral walls of the spherical pneumatophore. Fewkes **82** only describes a similar pigmentation in his *Agalma papillosum*. But in his specimen the relative size of pneumatophore to the other appendages is not so strikingly different as in ours. Perhaps *Agalma papillosum* also belongs to the genus *Crystallomia*.

In Cat. 71 B and 51 A. the appendages are the same as in 163 D. In 71 B. the nectophores and buds of nectophores, the primary siphon with its tentilla type I and palpons

are in the same stage of development. In 51 A. there is a young bract situated partly over the primary siphon; it is still wanting in 71 B. This second siphon has not yet developed its tentilla.

Cat. 71 A. (see table) shows the same pneumatophore as 71 B., a primary siphon with tentilla type I, a second siphon which now shows development of tentilla. These are the third in size; they are called tentilla *type III* (Pl. XIII, fig. 101). They are identical with those which DANA **58** figures in his *Crystallomia polygonata* and GEGENBAUR **60** in fragments of *Agalma Okenii (Crystallomia polygonata).* Their tentacle is sometimes quite extended and shows the tentilla situated alternately on each side. The involucrum is quite closed and campanulate. There are usually two rows of spindle-shaped nematocysts and three to five windings of the cnidoband. Terminally there are the median lobe and lateral filaments; the latter are never curled up. Already in this small specimen (71 A.) the tentilla of the second siphon are four times as big as the tentilla of the primary one. Except a few buds of nectophores and some palpons no other appendages are to be seen in Cat. 71 A.

The following numbers *Cat. 163 A.* (Pl. XII, fig. 95), *25 H.*, *25 E.*, *25 G.* gradually increase in size, although no new or other appendages are developed. They all show tentilla type I at the base of the primary, tentilla type III at the base of the second siphon. We give a sketch of Cat. 163 A. (Pl. XII, fig. 95).

In *Cat. 151 H.* a new type of tentilla is developed. It is called tentilla *type IV*; a tentillum (Pl. XIII, fig. 102) consists first of all of a great many more turns of the cnidoband. In young tentilla of type IV the involucrum closes entirely over the cnidoband, which shows then 6—7 turns; in older ones it seems the involucrum bursts and remains only partly covering the first 3 or 4 turns, in general those turns which show the large ensiform cnidocysts. Entirely developed, mature tentilla show from 7—13 turns of the cnidoband. For the rest they do not differ in structure from type III. They are never so broad as type III as the size of all the turns is more regular, and this is not the case in type III.

Cat. 151 H., *151 F.* (Pl. XII, fig. 93), *151 C.*, *215 L.*, *163 B.*, *88 L.* all show the development of the primary siphon with tentilla type I, the second siphon with tentilla III and IV. That two types of tentilla occur at the base of one siphon means probably that they arise from the same tentacle. This, however, we could not make out; the tentilla type III always have long pedicles, and in many cases the tentacle was fully extended both projecting beyond the external line of the other appendages. On the other hand we never saw a regular tentacle beset with tentilla type IV; these are always situated at the base of the siphon.

Tentilla type IV have never been described by any other authors.

The pneumatophore of Cat. 151 F. is in relation to the other appendages very large and strongly pigmented. One of the nectophores is more developed than the younger buds. The stem is short, all the appendages are still grouped around a central more disc-like siphosome. Besides 12—15 palpons with their palpacles there are the two siphons (the primary and the second) the second siphon bearing tentilla type III with their tentacle and sessile tentilla type IV. A young third siphon does not yet show any tentilla.

The bract which is also shown in our sketch of Cat. 151 F. bears the shape of a

regular *Crystallomia* bract. On the stem there are indications of bracts which have become detached through the contraction of the stem by preservation.

The nectosome gets more lengthened, as is the case in Cat. 215 L., where its length amounts to $4^1/_2$ mm.; there one sees muscular bands, the indication of detached mature nectophores.

Cat. 25 B. is interesting since it forms the transition between the specimens which are much larger and it shows besides the primary siphon with tentilla type I, a second one with tentilla type III and IV and a third one whose tentilla are not yet differentiated.

Cat. 151 D., 175 D., 175 C. stand almost at the same height of development. They are larger; mature nectophores and bracts have unfortunately been detached, the muscular remnants both on siphosome and nectosome showing the place where they were united to the stem.

In all the above-mentioned specimens the reproductive organs were invisible. A very small female gonostyle is to be seen at the base of the third siphon in Cat. 25 A. The nectosome in this specimen (Pl. XII, fig. 92) measures 8 mm. in length; no mature nectophores have remained on the nectosome.

In all the Catalogue-numbers above mentioned there were always more developed or quite mature bracts which show the same shape as those described by other authors in *Crystallomia*.

Cat. 88 E. and *25 A.* show very beautiful purple-coloured pigment in the upper part of the pneumatophore, some distinct mature bracts and a small ♀ gonodendron near the base of the third siphon. The ♀ gonophores are clearly distinguished in Cat. 25 A.

No specimen in which one sees the development of the fourth siphon first without distinct tentilla, then with its definite ones, was found in the Siboga material.

Of all the specimens of this first group of *Crystallomia*, *Cat. 88 F.* is assuredly the most complete.

The pneumatophore has purple-pigment at its top; no mature nectophores are left, they have all dropped off; the siphosome consists of 5 siphons, the primary with tentilla type I, the 2^{nd}, 3^{d}, 4^{th} and 5^{th} with tentilla type III and IV. The three last siphons show gonostyles, which are already elegantly botryoidal. The youngest ♀ gonostyle is, of course, situated near the base of the third siphon. We could not make a sketch of this specimen as through torsion of the stem all the appendages had gone out more or less of their place, and because a few well-developed bracts covered these entirely and made it more difficult to sketch the specimen. The whole has a length of 15 mm.

The next *Cat. 88 M.* (Pl. XII, fig. 94) is smaller than 88 F., as it only shows two distinct siphons. Whilst however in 88 F. the primary siphon was absolutely normal in shape, it seems that the same in 88 M. (Pl. XII, fig. 94) is reduced in size and that even its tentilla type I are not as normal as they ought to be. This, of course, may be quite accidental, but we rather incline to think that the primary siphon with its tentilla I falls off. All the following specimens of the table lack the primary siphon and we suppose that 88 M. represents the intermediate stage between those specimens which possess a primary siphon and those where the primary siphon fails.

In the last eleven specimens standing underneath 88 M. in the table we find a constant increase in size. Cat. 53 stands more apart, as the appendages are so much larger than in any other specimen that we are sure, it must be an exceedingly old one, although only three siphons with tentilla III and IV are left, but certainly some cormidia have fallen off.

The Catalogue-numbers 24 D., 88 K., 163 C., 88 N., 88 P., 215 A., 223, 175 F. all belong to *Crystallomia* and are probably of the same age. The respective sizes of these specimens are:

Cat.	Length nectosome.	Length siphosome.
24 D.	4 mm.	2 mm.
88 K.	3 mm.	2 mm.
163 C.	3 mm.	2 mm.
88 N.	4 mm.	3 mm.
88 P.	4 mm.	4 mm.
215 A.	6 mm.	4 mm.
223.	2 mm.	2 mm.
175 F.	3 mm.	1,5 mm.

An absolute uniformity in the shape of all these is of course impossible, as in some the nectosome is contracted, in others extended, or sometimes many appendages have been lost through the influence of the preserving fluids.

The eldest cormidia may have fallen off; this seems likely, when we compare these specimens with the complete Cat. 88 F., the more so as we saw the development of ♀ gonostyles near the third, fourth and fifth siphon. As they fail in the other 8 specimens (Cat. 24 D.—175 F.) we rather incline to believe that the cormidia with reproductive organs have fallen off. We will return to the same subject later on.

Cat. 53 (Pl. XIII, fig. 103) is a huge specimen, measuring $2^1/_2$ cm. in length, — measured from the top of the pneumatophore to the apex of the bract which is situated in the same direction as the longitudinal axis of the nectosome — its breadth measures also $2^1/_2$ cm. measured from one of the palpons of the longitudinal siphosome to the most distant bract.

All the appendages have considerably increased in size.

The pneumatophore is well-shaped, elongate, slightly coloured at its top. The nectophores have all become detached; a few buds of nectophores are left near the top. Immediately underneath these we find a thickened part of the nectosome. This is a portion of the contracted stem, there where mature nectophores were situated. We noticed this thickening of the nectosome in many other specimens. Between the first appendages of the siphosome and the above-mentioned part traces of detached nectophores are still to be seen.

The siphosome has an exceedingly broad aspect owing to the immense quantities of bracts, which are attached on the stem. All the appendages are entirely covered by them; to make our sketch of Cat. 53 more distinct, we detached those which were on one side of the siphosome. The remaining ones are all sketched in their natural position.

A pecularity in the structure of many bracts in Cat. 53 is the appearance of small islands in the cartilaginous substance, each composed of some 20 or more polyhedral cells (Pl. XIII, fig. 104). Some of them show a nucleus only, others are filled up with small granules.

They are colourless. Perhaps they are identical with the glands described 1888 by Bedot. Those in *Agalma Clausi* (*Stephanopsis Clausi* Bedot **95**) were coloured. Of course the pink colour may have disappeared after preservation. These glands occur only in the anterior part of the bract. The difference between these and the "petites glandes colorées" of Bedot is the agglomeration of "corps sphériques" around these glands, which were lacking in our specimen.

Besides the many buds of young appendages, we could distinguish three mature siphons with their tentilla type III and IV, a great many palpons, and near the base of each siphon female and male reproductive organs of which the latter are very well developed (Pl. XIII, fig. 103). Their exact position on the stem could not be made out.

It is to be noted that all the appendages (except part of the bracts) are situated on one side, the ventral side of the stem. It is therefore very probable that the position of the corm in the water is a horizontal one, and that when swimming the appendages hang down into the water, and the pneumatophore has an upright position making a right angle with the nectosome.

In our sketch one of the siphons situated near the most proximal androphores is not sketched as it became detached whilst we were examining the specimen. The presence of such large androphores shows that the specimen is an older one, than any of the above-mentioned.

Cat. 154 (Pl. XIV, fig. 105) gives us a very clear idea of the remarkable contorsions of the stem in *Crystallomia*. Of the five mature siphons none lies exactly ventral, three of them are more lateral to the left, two more lateral to the right.

Notwithstanding the considerable number of appendages, no reproductive organs could be found in this specimen. They are assuredly developed, but so small that they easily get covered over by palpons, bracts, etc. The fourth, fifth and sixth siphons only show tentilla type IV. We suppose that the tentacle with tentilla III was lost accidentally.

The last specimen *Cat. 24 F* has an elongated nectosome and only one mature siphon with big tentilla IV. Judging from the length of the nectosome we suppose that several cormidia have become detached.

Finally we include under *Crystallomia* spec. group I a detached cormidium, which we will discuss later on.

46. *Crystallomia* spec. group II. Pl. XIII, figg. 99, 100; Pl. XIV, figg. 106—109; Pl. XV, figg. 110—112.

Stat. 118. Lat. 1° 38′ N., Long. 124° 28′.2 E. *Cat.* 93 A. alc. 90°/$_0$. One specimen.
Stat. 136. Ternate-anchorage. *Cat.* 24 B., 24 C., 88 A., 88 B., 88 C., 88 D., 88 G., 88 H., 88 J., 88 O., 151 A., 151 B., 151 E., 151 G., 151 J., 175 G., 176 B., 176 C., 176 D., 176 F., 215 D., 215 F., 215 K., 215 O., 215 R. formald. 4°/$_0$. 25 specimens.
Stat. 144. Anchorage North of Salomakië-(Damar-)island. *Cat.* 122 A. formald. 4°/$_0$. One specimen.
Stat. 146. Lat. 0° 36′ S., Long. 128° 32′.7 E. 2$^1/_2$ miles North of Eastern Widi-group. *Cat.* 33 A. alc. 90°/$_0$. One specimen.
Stat. 157. Lat. 0° 32′.9 S., Long. 130° 14′.6 E. 4$^1/_2$ cables N.N.W. of the North-point of Great Fam-island (Jef-Fam-Besar). *Cat.* 38 C. formald. 4°/$_0$. One specimen.
Stat. 186. Lat. 3° 10′.5 S., Long. 127° 26′ E. North-side of Manipa-strait. *Cat.* 25 F., 25 G., 25 L., 25 N., 25 Q., 25 R. formald. 4°/$_0$. 6 specimens.
Stat. 203. Lat. 3° 32′.5 S., Long. 124° 15′.5 E. *Cat.* 173 A. formald. 4°/$_0$. One specimen.

Cat. N°	1st siphon	2d siphon	3d siphon	4th siphon	5th siphon	6th siphon	7th siphon	8th siphon
25 R.	II	II						
175 G.	II	II						
122 A.	II	II						
176 C.	II	II						
215 D.	II	II						
25 Q.	II	II	II					
88 J.	II	II	II					
176 B.	II	II	II					
24 B.	II	II	II					
25 N.	II	II	II					
176 D.	II	II	II					
93 A.	II	II	II					
215 O.	II	II	II					
24 C.	II	II	II					
88 H.	II	II	II	II				
176 F.	II	II	II	II				
151 A.	II	II	II♀	II♀	IV♀			
25 G.	—	II	II	II	IV			
25 F.	—	II	II	II	IV			
151 E.	—	II	II	II	IV III			
88 D.	—	II	II♀	II?	IV III?			
88 O.	—	II	II♀	II?	IV III?	IV?		
88 G.	—	II	II♂	II♀	IV?	IV III?	IV III?	
88 B.	—	II	II♀	II♀	IV?	IV III?	IV?	
215 K.	—	—	II	II	IV			
151 B.	—	—	II	II	IV III	IV III		
88 C.	—	—	II	II♀	IV III♀	IV♀	IV?	
88 A.	—	—	II	II♀	IV III♀	IV III?	IV?	IV III?
173 A.	—	—	—	II	IV			
215 F.	—	—	—	II	IV			
25 L.	—	—	—	II	IV			
215 R.	—	—	—	II	IV			
38 C.	—	—	—	II	IV	IV		
151 G.	—	—	—	II♀	IV	IV		
151 J.	—	—	—	II	IV III	IV III	IV III	
33 A.	—	—	—	—	IV	6?		

In the first group of *Crystallomia* spec. it was comparatively easy to arrange all the specimens so that they formed a regular series, beginning with the youngest larval stage to the most developed one. We found how the primary siphon with its tentilla I drops off and is replaced by younger definite siphons with different tentilla of which we described the two types.

In the second group of *Crystallomia* spec. of which 25 out of 35 belong to one station, this primary siphon with tentilla I always fails, but we found groups with tentilla absolutely differing from the other three types of tentilla. These are tentilla type II. They are second in size (Pl. XIII, figg. 99, 100); the involucrum is entirely closed over the cnidoband in fig. 99. In our sketch of fig. 100 the last half spiral has somewhat loosened itself and has pierced the involucrum. Other tentilla, however, showed us clearly how the involucrum is normally closed. The cnidoband consists of $1^1/_2$—2 turns, the first turn showing one or two rows of ensiform

cnidocysts. The lateral filaments are short, horn-shaped and always curled up. They are small compared with the median lobe which has twice the length of the lateral filaments and is quill-shaped. They occur in great numbers at the base of the siphon; occasionally we found an extended tentacle bearing a great number of these tentilla.

The tentilla which most resemble our type II are those which HAECKEL **88b** figures for his *Crystallodes vitrea*. The size is also very much the same. We found however in some of our young specimens of group II tentilla which were smaller, whilst in older specimens we found also larger tentilla. Whilst examining this second group, we supposed that in the well-preserved smallest one the siphon which was lying farthest, should be considered the first developed and therefore the oldest.

We found in Cat. 25 R. two siphons, which bore the same kind of tentilla. A specimen with only one siphon with tentilla did not — to our regret — come under observation. We were very much astonished to find only one kind of tentilla, especially as the specimen was comparatively small. It was only natural to suppose that these tentilla type II would represent the definite ones of the group. And we found the following series of development: Cat. 25 R., 175 G., 122 A., 176 C., 215 D. showed two developed siphons with tentilla type II, Cat. 25 Q., 88 J., 176 B., 24 B., 25 N., 176 D., 93 A., 215 O., 24 C., three mature siphons with the same, Cat. 88 H. and 176 F. as many as four siphons with tentilla type II.

To our astonishment we found that the following Catalogue-number 151 A. consists of four siphons with tentilla type II and a fifth with young tentilla type IV, identical with the same in the first group of *Crystallomia*.

It seems difficult to believe that all these four siphons with tentilla type II are provisionally ones, especially as the third siphon in Cat. 151 A. already shows the development near its base of a young female gonodendron. We should then have to consider those specimens in group I which have lost their primary siphon in the same stage of development as those in group II which have lost all their 4 siphons; in our series it would be the very last Cat. 33 A.

A larger collection of complete material may perhaps give a less complicated view of the question.

At any rate we tried to continue our series as we had done in group I, putting under 151 A. those specimens which showed less than four siphons with tentilla type II and so on, up to 33 A. which has none left.

A stage of abnormal development of either of the oldest siphon or its tentilla was unfortunately not represented. This classification of our specimens of course is not a definite one.

The different specimens of this second group show more variation in shape from one another than in the first group. A glance at the 6 specimens of *Crystallomia* spec. group II figured on Pl. XIV, figg. 106—109 and Pl. XV, figg. 110—112 shows clearly the accuracy of this statement.

Cat. 175 G. Pl. XIV, fig. 106 (25 R. is not sketched as its appendages were very much altered by the preserving fluids) has a nectosome of $1^1/_2$ mm. length, a siphosome of about 2 mm. The pneumatophore is small, elongate, with a little purple pigment cap at its top. It has not the beautiful shape which we find in the young specimens (f. i. Cat. 51 A.) of group I.

A few buds of nectophores and remains of detached ones are visible on the nectostem. The nectosome stands diagonally on the siphosome, probably through contraction. The latter consists of two siphons of which the second is still very young. Both show splendid tentilla type II of which we have given the description above. A young bract, 9 palpons and their palpacles belong to the specimen. No reproductive organs were to be seen. We give on purpose a sketch of *Cat. 88 J.* (Pl. XIV, fig. 107) to show how very different a specimen looks when the nectophores are preserved on the stem. The nectosome has here a length of about 11 mm. The pneumatophore is exceedingly small; purple pigment is also to be found and a few buds of nectophores. The pneumatophore and the buds are insufficiently indicated in our sketch. Of the shape of the nectophores we cannot say any thing definite, as it is very much altered through preservation. Two are situated on one side, three on the other. As no other traces were to be seen on the nectosome, we suppose this nectosome for once to be complete.

The siphosome consists of three siphons each with their tentilla type II, the two oldest with extended tentacle. They are covered by polygonal bracts, their shape being characteristic of those in *Crystallomia* Dana. Palpons, remains of lost bracts, young bracts of the same, were all visible, reproductive organs only were wanting.

Cat. 176 F. (Pl. XIV, fig. 108) again shows a contracted muscular nectosome and an elongated threadlike siphosome, exactly the contrary of Cat. 88 J. In the nectosome (length $2^1/_2$ mm.) mature nectophores are absent and the pneumatophore (which in our sketch is directed to the other side and therefore only half visible) is small. The siphosome is well-developed (length 8 mm.) and shows four mature siphons each bearing numerous tentilla type II. We looked in vain for any reproductive organs. Bracts, remains of detached bracts, palpons and their palpacles are situated on the siphosome.

The great difference between Cat. 176 F. and the following number *151 A.* is the presence of a fifth siphon with absolutely different tentilla from the four other ones.

In Cat. 151 A. (Pl. XIV, fig. 109) the nectosome has a length of 6 mm.; two nectophores are left on the nectosome, together with buds of young nectophores and remains of detached ones. The siphosome (length 17 mm.) shows five siphons at regular distances one from the other, four with tentilla type II, the youngest fifth with tentilla IV. Palpons, palpacles, bracts are all scattered on the stem; a great many are lost. A further pecularity of Cat. 151 A. is the presence of three female gonostyles near the base of the three youngest siphons. This is interesting as in former numbers no trace was to be seen. We suppose, however, that they were developed, although so very little differentiated from other buds on the siphosome, that they could not be recognized. In our series of the different specimens it can be seen how female and even male gonophores (Cat. 88 G.) are also developed on the same third siphon in Cat. 88 D., 88 O., 88 G., 88 B.

In *Cat. 151 E.* we found in the youngest mature siphon an extended tentacle with tentilla type III, identical with the same in group I. Here again we suppose that this tentacle had detached itself in Cat. 151 A. The same can be seen in the table for many other specimens.

The following numbers *25 G.*, *25 F.*, *151 E.* all show three mature siphons with tentilla type II and one youngest with tentilla type IV (151 E. also with tentilla type III). We suppose that the most distal and oldest siphon had dropped off.

Cat. 88 D. (Pl. XV, fig. 111) belongs to the same stage of development. In the third siphon (in the sketch the second) we saw a young female gonodendron, whilst in the fourth and fifth there were buds, which were not differentiated enough to be called gonostyles. In the table we have used a note of interrogation wherever we could not decide about the absence or presence of any reproductive organs.

Cat. 88 O., *88 G.* and *88 B.* still show three siphons with tentilla II. (88 G. has moreover male gonophores).

In *Cat. 215 K.*, *151 B.*, *88 C.*, *88 A.* two siphons with tentilla type II are left. Gonodendra appear near the fourth (second in reality) siphon, 88 A. shows already four mature siphons where both tentilla IV and III are represented.

In *Cat. 173 A.*, *215 F.* (Pl. XV, fig. 110), *25 L.*, *215 R.* there are only two siphons left, the oldest with tentilla II, the youngest with tentilla IV. We suppose that gonostyles are being developed, but not differentiated enough to be seen.

Cat. 38 C., *151 G.*, *151 J.* consist of cormidia with three siphons, the tentilla type II belonging to the oldest. As we found a female gonodendron near the oldest siphon of 151 G. we suppose there must be one too in 38 C., 215 R., 25 L., 215 F. and 173 A.

Finally *Cat. 33 A.* has only one siphon with tentilla IV. It is doubtful whether this specimen belongs to *Crystallomia* group II, as there are only tentilla type IV. It may also belong to *Crystallomia* group I.

47. Detached cormidia of *Crystallomia* spec. group II. Pl. XV, fig. 112.

Stat. 130. Lat. 5° 0 N., Long. 125° 26'.5 E. *Cat.* 227. alc. 90°/₀. One specimen.
Stat. 136. Ternate-anchorage. *Cat.* 24 E., 24 G., 71 H., 71 J., 176 A., 176 G., 215 B., 215 C., 215 E., 215 G., 215 H., 215 M., 215 N., 215 P., 215 Q. formald. 4°/₀. 15 specimens.
Stat. 141. Lat. 1° 0'.4 S., Long. 127° 25'.3 E. *Cat.* 44 A., 44 B. formald. 4°/₀. 2 specimens.
Stat. 148. Lat. 0° 17'.6 S., Long. 129° 14'.5 E. *Cat.* 145 D. alc. 90°/₀. One specimen.
Stat. 157. Lat. 0° 32'.7 S., Long. 130° 14'.6 E. 4 1/2 cables N.N.W. of the North-point of Great Fam-island (Jef-Fam-Besar). *Cat.* 38 B. formald. 4°/₀. One specimen.
Stat. 186. Lat. 3° 10'.5 S., Long. 127° 20'.5 E. *Cat.* 25 D., 25 K., 25 J., 25 O., 25 P., 25 T. formald. 4°/₀. 6 specimens.
Stat. 189ᵃ. Lat. 2° 22' S., Long. 126° 46' E. *Cat.* 65 A. formald. 4°/₀. One specimen.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 173 E. formald. 4°/₀. One specimen.

In the description of *Crystallomia* spec. group I and *Crystallomia* spec. group II we formulated the opinion that cormidia might detach themselves after a certain stage of development. In *Crystallomia* spec. group I the primary siphon with probably larval tentilla disappears; in the second group we saw how *Crystallomia* spec. develops four siphons all with another kind of (? larval) tentilla and how one after the other these drop off and are substituted by younger siphons with different, now definite, tentilla.

We have reason to think this supposition right, as in the Siboga material loose cormidia exactly resembling the siphosome and its appendages of *Crystallomia* spec. group II were found, belonging in many cases to the same station as the complete specimens of this group. Comparing the list of stations given above of these detached cormidia with the same in *Crystallomia* group II, we find that stat. 136, 157, 186 and 203 occur in both.

We cannot decide whether this loosening of cormidia from the siphosome has any value and means any interesting period in the development of *Crystallomia* to be compared with the detachment of appendages in the shape of *Eudoxids* and *Ersaeids* in *Calycophora*.

We give a sketch of one of them (Cat. 215 B. Pl. XV, fig. 112) which shows two siphons with numerous tentilla type II and palpons at regular intervals one from the other and apart from this some palpons with a female gonodendron, the whole surrounded by bracts. We might suppose that the tentilla and siphon of this last group were lost.

We also find detached cormidia consisting of only one siphon with tentilla, and another cormidium in which palpons and gonostyle only are preserved.

48. More-developed specimens of ? *Crystallomia* spec. group II.

Stat. 141. Lat. 1°0'.4 S., Long. 127°25'.3 E. *Cat.* 108, 109 (detached appendages probably of Cat. 108). formald. 4%. One specimen.
Stat. 207. Lat. 5°7'.5 S., Long. 122°29' E. Buton-strait. *Cat.* 221, 222 (detached appendages probably of 221). formald. 4%. One specimen.
Stat. 316. Lat. 7°19'.4 S., Long. 116°49'.5 E. *Cat.* 26. alc. 90%. One specimen.

Comparing *Cat. 108* with the most developed specimens of *Crystallomia* group II we cannot find any essential difference, the reproductive organs only having increased in size. The nectosome has a length of 6 mm. and shows, besides some buds of nectophores and indications of detached ones, one well-developed mature nectophore. The siphosome (describing an angle of 45° with the nectosome) consists of two mature siphons with well-developed tentilla type IV, on which we could find more than twelve turns of the cnidoband. The ♀ gonodendra and the androphores have probably detached themselves near these two oldest siphons. The third cormidium shows, besides very well-shaped tentilla type IV and a few mature palpons, also some androphores of which one attains a considerable length, showing the same size as a palpon. This also shows that the specimen is older than those of *Crystallomia* spec. group II. The third and youngest siphon does not yet show any appendages. The siphosome is entirely covered by well-developed polygonal bracts. *Cat. 109* consists of three cormidia and these do not differ in shape and size from those of Cat. 108; they probably belong to each other.

In *Cat. 221* and *222* the siphons are abnormally elongated. The nectosome in Cat. 221 is naked, the nectophores having all fallen off; it has a length of 10 mm., a breadth of 2,5 mm. The siphosome is entirely covered over by thick, cartilaginous, polygonal bracts and consists of four cormidia, each cormidium bearing an absolutely elongated transparent siphon, which but for the distal, darker coloured basigaster, would have been mistaken for a palpon, the more so as regular mature palpons have fallen off. One of these siphons has a length of 13 mm. The tentilla type IV are situated at the base of the siphon and attain considerable length. Female and male gonophores are present in the later stages of development. Cat. 222 consists of detached cormidia probably of Cat. 221 as the siphons show the same abnormal length.

Finally *Cat. 26* shows us a specimen of which the siphosome especially has assumed large proportions. But again through preservation in alc. 90% the general shape has much altered and through contraction the numerous appendages have been placed on all the sides of the

stem. The nectosome has a length of 2 cm., the siphosome of 7 cm. Still we cannot identify this specimen with DANA's **58**, HAECKEL's **69**, **88b** and BEDOT's **95** absolutely complete and normal ones. The denomination *Crystallomia* spec. seems to us sufficient at the present moment, as the bracts show the regular polygonal shape. The nectosome possesses eight mature but absolutely shapeless nectophores, the siphosome thirteen siphons with tentilla type IV, a great many palpons and ♂ and ♀ reproductive organs, the whole surrounded by thirteen bracts. Of the true position of all these appendages nothing can be said as the stem shows too many contorsions and abnormal windings.

Stephanomia Per. et Les.

49. *Stephanomia* spec. Per. et Les. Pl. XV, figg. 113, 114.

Stat. 208. Lat. 5° 39' S., Long. 122° 12' E. On cable *Cat.* 115 A. One specimen, 115 B. (detached appendages probably belonging to 115 A.). formald. 4°/₀.

Stephanomia as it is described by PERON and LESUEUR **07** and by HUXLEY **59** is incomplete as the specimens described by these authors were found without nectosome. But the siphosome is well characterized by the presence of large, thick cartilaginous, foliaceous bracts.

In only one specimen of the Siboga expedition (Pl. XV, fig. 113) this peculiar shape of foliaceous, and at the same time thick and tough, bracts was found again and we do not hesitate therefore to call this specimen *Stephanomia*. But other characteristics failed; the nectosome has completely dried up and bears one shapeless nectophore. The siphosome shows three well-developed and some buds of siphons, the bract "*a*" being sketched magnified 2,8 times. The only appendage to be recognized is a siphon at the distal end; tentilla, mature palpons, gonophores were all wanting. Comparing our sketch of the bract (Pl. XV, fig. 114) with HUXLEY's **59** Pl. VI, fig. 6*a*, 6*b*, we see there is considerable analogy between the two.

Halistemma Huxl.

50. *Halistemma* spec. Huxl. 59. Pl. XV, fig. 115.

Stat. 141. Lat. 1° 0'.4 S., Long. 127° 25'.3 E. *Cat.* 153. formald. 4°/₀. One specimen.

Under the name *Halistemma* spec. we describe one specimen from the Siboga expedition (Pl. XV, fig. 115) which through incompleteness of the appendages cannot receive a definite specific denomination.

The nectosome has a length of 13 mm., of which 3 mm. must be reckoned to the curved proximal part. The pneumatophore is oval, small, bearing some pigment at the top. A few buds of nectophores are situated near the pneumatophore and one mature absolutely developed one is yet situated on the stem. The gelatinous substance of the latter has undergone much alteration. The nectostem itself shows distally indications of detached nectophores (not visible in this sketch).

The siphosome has a length of only 4 mm. and bears terminally a siphon of 7 mm. length. This siphon bears at its base (the tentacle was probably contracted) a multitude of

tentilla which have the characteristic shape described by Huxley **59**. They possess no involucrum, six to eight turns of the cnidoband and these end in a simple terminal filament. There are no palpons in this cormidium. These appear near the second siphon, they are not sessile but bear long stalks. This second siphon also bears numerous tentilla. More proximally still, we find a third and fourth siphon, both young and with undeveloped tentilla.

Finally there is yet one bract which is cartilaginous and has a foliate shape.

Gonophores were not found in this specimen.

51. *Halistemma cupulifera* nov. spec. Pl. XVI, figg. 116—119.

Stat. 244. Lat. 4° 25'.7 S., Long. 130° 3'.7 E. Depth 2991 M. *Cat.* 60. formald. 4°/₀. One specimen.

We describe under the name of *Halistemma cupulifera* a specimen, which owing to the structure of its tentilla we consider new to science.

It has probably undergone much alteration through the preservation, as many of its appendages are lost and its stem is contracted. Its general aspect as shown on Pl. XVI, fig. 116 will therefore hardly correspond to reality when some day it will be examined alive.

The pneumatophore is elongated, pointed towards its apex, and bears an annular constriction near the middle of the air-sac.

The nectosome consists of a short, strongly muscular nectostem of 4 mm. length and 1,5 mm. breadth. There are only three buds of young nectophores left situated nearer to the top of the nectostem. They show paired lateral bunches of cnidocysts; the shape could not be more closely determined as they are not yet enough developed. There are further more indications of detached nectophores on the nectostem.

The siphosome is only very short; its actual length cannot be given, as it is partly covered over by its appendages. There are four siphons, of which the oldest, the first developed one, is situated terminally. The second and the third are also mature (length of the third siphon 5 mm.). These three all bear numerous tentilla some of which are entirely developed and mature. They consist (Pl. XVI, figg. 117, 118) of a cnidoband (no involucrum) which shows four to five spiral turns. The first two turns show moreover ensiform cnidocysts on both sides. In the tentillum which we have sketched the spiral turn is loose, which enables one to distinguish well the elastic band. The cnidoband ends in a terminal filament which shows cnidocysts entirely different from those of the cnidoband. It is in all cases contracted and bears at its terminal end a small acorn-cup-shaped appendage (*cupulifera*) the basal part consisting of (Pl. XVI, fig. 118) an agglomeration of the small circular cnidocysts of the terminal filament and proximally of many delicate ectoderm-cells. This latter part is often absent and in the specimen many tentilla are found which consist only of the fine small cup-shaped, concave appendage. As far as we know, a tentillum such as this one has not yet been found. These tentilla and many stages of development are found near the base of the first, second and third siphon. A tentacle was probably contracted.

Between the third and the fourth siphon a space is left open which in life was probably filled by another siphon. We suppose this to be the case, as the following siphon is young and

small and bears near its base a quantity of thread-like, tubular tentilla. There are no younger siphons than this last one.

The palpons are elongate, cylindrical, not quite transparent but more whitish opaque. They are scattered irregularly on the stem. Not one palpacle was found, we suppose they became detached when the specimen was captured.

Of bracts there were only two left. They are situated in the open space, where a siphon had become detached. One, the largest in size, has undergone complete alteration and has become shapeless, the other is smaller and has a length of 5 mm. It is absolutely flattened (Pl. XVI, fig. 119) and has a foliate appearance, two small incisions occur on both sides, which even on the right side attain the appearance of a lobe.

The canal in the bract goes throughout the gelatinous substance; it is cylindrical near its base and gets more and more pointed towards its apex. On the dorsal side of the bract, two oval structures are to be seen, the right being somewhat smaller than the left. They are situated in the centre of the bract, and on the left and right sides of the canal. They seem to consist of granules imbedded in a cavity of the gelatinous substance. From both these (?) glands microscopically small threads issue. The right small canal goes down and meets the canal of the left gland which has its course straight over the main canal of the bract. They then lose themselves very soon in the gelatinous substance and no further trace can be seen of them. Owing to the granular interior structure we rather incline to think they are agglomerations of pigment which through preservation have lost their colour.

At any rate these structures do not resemble the glands we found in *Crystallomia* spec. (p. 77) nor those which Bedot described **95** in *Stephanopsis Clausi*. The gonophores are also present, they are irregularly scattered on the stem, so that one gonodendron consisting chiefly of undeveloped gynophores seems to be situated on the dorsal side of the stem. We counted three ♀ gonodendra; androphores were not found.

Fam. Physophoridae Huxl. 59.

Physophora Forsk.

52. *Physophora hydrostatica* Forsk. Pl. XVI, figg. 120—122.

= *Physophora hydrostatica* Forsk. 1775.
= ? *Physophora musonema* Per. et Les. 07.
= *Physophora hydrostatica* Eschsch. 29.
= *Physophora Philippii* Köll. 53.
= *Physophora hydrostatica* Vogt. 54.
= *Physophora hydrostatica* Lkt. 54.
= *Physophora hydrostatica* Ggbr. 60.
= *Stephanospira insignis* Ggbr. 60.
= *Physophora hydrostatica* Cls. 60.
= *Physophora Philippii* Kef. et Ehl. 61.
= *Physophora magnifica* Hkl. 69.
= *Physophora borealis* M. Sars in Koren & Danielsen 77.

= *Physophora hydrostatica* Fewk. 79.
= *Physophora magnifica* Ch. 88.
= *Physophora hydrostatica* Ch. 97a.
= *Physophorr hydrostatica* K. C. Schneider 98.

Stat. 143. Lat. 1° 4'.5 S., Long. 127° 52'.6 E. *Cat.* 230. formald. 4°/₀. One specimen.
Stat. 203. Lat. 3° 32'.5 S., Long. 124° 15'.5 E. *Cat.* 173 B. formald. 4°/₀. One specimen.

The two specimens which were brought home by the Siboga expedition are very much the worse for preservation, having altered entirely. The disc-shaped siphosome is, however, easily recognized (Pl. XVI, figg. 120, 121) and we think we are justified in using the specific denomination "*hydrostatica*" as on the whole the specimens, as they are, do not show any specific differences.

We first of all want to give a short description of Cat. 173 B. (Pl. XVI, fig. 121) which is remarkable for the enormous size of its pneumatophore. CHUN (**97a** p. 270) found nearly the same length in the pneumatophore of *Physophora hydrostatica*. His specimen showed the length of 12 mm. and the breadth of 3 mm. We found the dimensions of 10 mm. length, $1^1/_2$ mm. breadth.

As in CHUN's specimen the pneumatophore is elongated and transparent, its outer walls having an absolutely straight course and narrowing gradually near the top, where they are covered over by dark brown coloured pigment. The entodermal septa separating radial pouches are visible on the outer wall as longitudinal stripes; this is probably the result of the excessive lengthening of the pneumatophore. A stigma was not found on the dorsal side.

The nectosome has a length of 4 mm.; on the ventral side we found a quantity of buds of young nectophores. Some indications of detached mature ones could also be seen, but nothing can be said of the exact position of these on the nectostem.

The siphosome is disc-shaped, flattened dorso-ventrally. It bends to the right but is not yet grown together.

Immediately on the right side of the nectosome some small buds are developed, which are not yet differentiated. To the right we find one very long palpon (18 mm.) with its partly broken palpacle. The disc shows furthermore a considerable quantity of stalks of siphons, palpons, tentacles and four gonodendra, on which only a few gynophores are left. Tentilla are not present. The exact position of the appendages on the disc is of course, owing to the absence of any mature ones, impossible to describe. Finally the most distal part of the spiral shows two small stalks of siphons.

Cat. 230 (Pl. XVI, fig. 120) is more complete as to the amount of appendages on the siphosome. Its nectosome shows a pneumatophore of 2 mm. length and 1 mm. breadth. We see here very clearly the radial pouches, which were invisible in the other specimen. The nectosome consists of one more developed nectophore and indications of detached ones. It has a length of nearly 1,5 mm.

The disc-shaped siphosome is smaller than in Cat. 173 B. and shows regular facets such as M. SARS **77** described in *Physophora borealis* and HAECKEL **88a**. The appendages consist of two mature siphons, a mature palpon with its palpacle, and young undeveloped ones, and two

groups of tentilla which in relation to the size of the siphons, are of extraordinary dimensions. They have the characteristic aspect of those of *Physophora* (Pl. XVI, fig. 122). Reproductive organs are not to be found, so we suppose that the specimen is still very young.

How these appendages are exactly distributed inside the facets could not be seen as the stem was too much contracted.

Fam. ANTHOPHYSIDAE Brandt 35.

Anthophysa Brandt 35.

53. *Anthophysa formosa* Fewk. Pl. XVI, figg. 123*a*, 123*b*.

= *Athorybia formosa* Fewk. 82.
= *Plocophysa Agassizii* Fewk. 88.
= *Anthophysa Darwinii* Hkl. 88b.
= *Anthophysa formosa* Ch. 97a.
= *Athorybia formosa* K. C. Schneider 98.
= *Anthophysa formosa* Bedot 1904.

Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. *Cat.* 148 B.J. alc. 90°/₀. One specimen.
Stat. 185. Lat. 3° 20′ S., Long. 127° 22′.9 E. *Cat.* 100 G. formald. 4°/₀. One specimen.
Stat. 194. Lat. 1° 53′.5 S., Long. 126° 39′ E. *Cat.* 23 B. formald. 4°/₀. One specimen.

The litterature of *Anthophysidae* is a very complete one and we were fortunate enough to be able to peruse all the different articles written on these interesting specimens. The genus *Athorybia* Eschsch. **29** is entirely wanting in the Siboga collection and of *Anthophysa* we found only three very much altered incomplete specimens.

The genus *Anthophysa* was created by BRANDT **35** for a specimen caught by MERTENS. Unfortunately BRANDT's sketches were never published, and we have never had an opportunity of seeing them.

FEWKES **82** describes two specimens called *Athorybia formosa*, which HAECKEL identified with MERTENS' specimen. FEWKES **88** finds two other specimens and described them under a totally different new name *Plocophysa Agassizii* and adds in a note that HAECKEL is wrong when he thinks his *Athorybia formosa* described in **82** identical with MERTENS' *Athorybia rosea*. He even thinks it a new genus and calls it *Diplorybia*. HAECKEL **88b** in addition to the description of *Anthophysidae* writes that his *Anthophysa Darwinii* is closely allied to or perhaps identical with *Plocophysa Agassizii*. CHUN **97a** finds *Athorybia formosa* Fewk., *Plocophysa Agassizii* Fewk. and *Anthophysa Darwinii* identical. That FEWKES could make a new genus out of his material is simply owing to the fact that it was exceedingly altered through preservation.

As we could not consult MERTENS' figures of *Anthophysa* and cannot judge therefore whether his and FEWKES' *Athorybia formosa* are identical, we choose the denomination *Anthophysa formosa* in exactly the same sense as CHUN does, adding moreover to the list of synonyms BEDOT's work of 1904 who describes two specimens with various kinds of tentacular knobs, all probably representing different stages of development of these appendages. One of these (Pl. I,

figg. 4, 5) resembles very much the dendritic tentillum described by Fewkes **82**, another (Pl. I, figg. 6, 7) is identical with the *Athorybia*-type of tentillum, whilst it seems to us that figg. 8 and 9 are different stages of contraction of the *Athorybia*-type and figg. 10 and 12 young stages of the same type. But as Bedot says himself, this can only be decided when fresh, living material is used for investigation.

As was the case with Chun's material, our three specimens of *Anthophysa formosa* are very incomplete, as many appendages had become detached and the remaining ones were highly contracted.

Pl. XVI, fig. 123 gives us a general idea of what has become of the largest of the three specimens. Cat. 23 B. has a diameter of 4 mm. Its pneumatophore with dark-brown pigment-spots, the muscular bands (Fewkes **88** "hood") and one bract showing the characteristic paired lateral dentations made it clear to us that we had found an *Anthophysa formosa*. On the stem which at the same time covers up the entire wall of the pneumatosaccus a large quantity of appendages are to be found all representing young stages of gonophores, palpons and tentilla. They are present in such large quantities that it was impossible to describe their exact position. The tentilla are all of the *Athorybia*-type that is to say, a rudimentary involucrum, one spiral turn of the cnidoband, two lateral filaments and a median lobe. The involucrum shows moreover a spine-like protuberance, resembling that described by Bedot (**1904** Pl. I, fig. 6, form β) but somewhat more accentuated.

The two other specimens are exceedingly small ($2^1/_2$ and 2 mm. in diameter) and are probably young stages. They show a large pneumatophore which, in fact, constitutes the whole body of the specimen and on its outer wall one mature siphon, some muscular bands and many buds of palpons, etc. Bracts there were none; and of tentilla we found form E (fig. 10, Pl. I Bedot **1904**) and the *Athorybia*-stage. They were both too badly preserved for making sections or even for making a sketch of them.

Fam. Angelidae Fewkes 1884.

= Ordo Auronectae Haeckel 88a and 88b.
= Fam. Auronectidae Chun 97a.

In 1884 Fewkes published a short account of a *Siphonophore* which he considers a very close ally of the genus *Angela*, discovered by Rang and published by Lesson (**43**). He calls it *Angelopsis* and gives it the specific denomination "*globosa*".

His description of *Angelopsis* is short, but sufficiently clear; the sketches are not very satisfactory as Fewkes also acknowledged himself five years later. We reproduce one of Fewkes' sketches of 1889 which in our opinion is of considerable interest (Pl. XVIII, fig. 136).

Angelopsis globosa consists of a spherical float without any apical opening, smooth on the outer surface (diameter 7—10 mm.) containing interiorly a second thin-walled sac, which he supposes to correspond to the pneumatocyst of *Rhizophysa*. The lower floor of the float is

formed of the thickened outer walls and possesses a cavity within, which again is separated from another cavity by a muscular floor (Pl. XVIII, fig. 136 *f*). In the region where the thin walls of the outer wall of the float join the thick walls of the basal part are found "spherical bag-like structures" (Pl. XVIII, fig. 136 *gm*). The cavity of one of them was filled with bodies resembling those found on the lower floor.

The external surface of the thick walls is covered with clusters of bodies resembling sexual clusters in *Physalia* (Pl. XVIII, fig. 136).

This is a summary of what FEWKES could distinguish in his very imperfect material. We will not discuss here the suppositions which FEWKES makes with regard to the position of *Angelopsis* in the system.

In 1888 HAECKEL describes in his Challenger Report a new order of *Siphonophores*, which he calls *Auronectae* and which he considers absolutely new to science. They are characterized by the appearance of a new *medusoid*-like appendage called by him "*aurophore*". He includes in this group (but doubtfully) FEWKES' *Angelopsis* (**88b** p. 301), finds some relationship to his new genus *Auralia* but on the whole finds FEWKES' description of 1881 too inaccurate and the latter's examination of *Angelopsis* too superficial to allow of his identifying FEWKES' *Angelopsis* with his *Auralia*.

FEWKES in 1889 (**89a**) defends himself and gives a more extensive description of his specimen, recapitulating the one which he gave in 1884 and adding a few particulars concerning the bag-like structures, which in opposition to HAECKEL he continues to find dissimilar from nectophores. First of all he finds that it is very difficult to detach them from the float and secondly they have no bell-openings nor radial tubes. He thinks it not impossible that they are homologous to the aurophores, but unlike them they have no external openings. Of great interest in this publication is the more extensive sketch given of a section through the float and polyp-stem (**89a** Pl. VII, fig. 2) taken in the transverse direction, in which an opening is found inside the pneumatosaccus, which according to FEWKES is an opening of one of those bag-like structures into the float (Pl. XVIII, fig. 136 *o*.). Around this opening is an area having an elongate, elliptical shape, which is visible in the sketch as a lighter spot around the darker opening of which we spoke above. In describing *Archangelopsis* we shall have occasion to show the great importance this light spot plays in the exact comprehension of the structure of the pneumatophore in this new genus.

We agree with CHUN (**97a**) that FEWKES' paper would have become decidedly more valuable, had he made any series of sections through his specimen; but as he says himself, he did not intend his report to be either anatomical or histological (**89a** p. 155).

Comparing our material of the Siboga expedition with HAECKEL's extensive publication of 1888 (Challenger Report) it seems to us that we are able to give an entirely new view of the structure called aurophore and in doing so we shall have to criticise HAECKEL's conclusions in many instances.

It would seem to us, always judging by the facts, obtained in examining our own material, that HAECKEL has often drawn too largely on his imagination. It appears to us he made one fundamental mistake and that, by not carefully comparing his material with the drawings of

the *Auronectae* which he simultaneously intended for publication (the latter being perhaps not made by him but by Mr. Giltsch) the mistake was inaugurated. When then he began to write the text (after the completion of these sketches) he could not of course fail to draw wrong conclusions whenever the sketches were in any way deficient. The mistake concerns the position of the zone of proliferation (the German "Knospungszone") the area in which the very first buds of appendages are developed themselves.

We are strenghtened in this opinion by the fact that we have had the opportunity of personally examining some specimens of *Rhodalia miranda* described by Haeckel in his Challenger Report and now deposited in the British Museum. They were still well-preserved enough and are stained a bright red colour.

According to Haeckel's statement and to the figure given on Pl. IV, fig. 16 of his work **88b** we have to look for this zone of proliferation on the opposite (viz. ventral median) side of the *aurophore*, the position of which according to Haeckel is on the dorsal median line.

We looked in vain for young buds, or indications on the outer wall which would have given us the slightest idea that any young buds are ever developed there. And looking over carefully the other drawings made by Haeckel of *Rhodalia miranda*, we were struck by finding on Plate I, fig. 1 (the corm seen from the apical side), many rows of nectophores and actually on both sides of the *aurophore* smaller, younger nectophores. So it would seem to us that nectophores developed on the same side as the *aurophore* and it would seem strange that the other appendages, those of the siphosome, would have to develop on the exactly opposite side. This same contradiction in Haeckel's statement was also found by Schneider (**98** p. 155) but its great importance has only become clear to us, since we have studied *Archangelopsis* with the utmost care. Our own material seems namely to clear away all difficulties in regard to the exact significance of the so-called *aurophore* and gives at the same time an exact idea of the development of the appendages in this family of *Angelidae*.

Whilst describing our specimens we shall have at the same time the occasion to clear away Chun's doubts as to the analogy of the *aurophore* with the distal part or pneumatosaccus of *Physonecta*. We shall also compare our material with Haeckel's Challenger Report and Schneider's Histologische Mitteilungen of 1898 and hope that our final conclusions may prove satisfactory to everybody.

Archangelopsis nobis.

54. *Archangelopsis typica* nov. spec. Pl. XVII; Pl. XVIII, figg. 137—140.

Stat. 15. Lat. 7° 2'.6 S., Long. 115° 23'.6 E. Depth 100 M. *Cat.* 10 A., 10 B. alc. 90°/₀. 2 specimens.
Stat. 289. Lat. 9° 0'.3 S., Long. 126° 24'.5 E. Depth 112 M. *Cat.* 22. formald. 4°/₀. One specimen.

This new genus *Archangelopsis* bears a general resemblance to Fewkes' *Angelopsis globosa* but differs from it and from *Rhodalia* Haeck. by the fact that the siphosome instead of being of a spongy structure such as it is in Haeckel's specimens (**88b** Pl. IV, fig. 15) or partly filled by a gelatinous (?) substance as in Fewkes' (Pl. VII, fig. 2) specimens contains one vast cavity with which the appendages are in communication (see our Pl. XVII, fig. 124).

We have no hesitation in making a new genus for our three specimens, FEWKES' description not being quite satisfactory. This is entirely due to the bad preservation of his unique specimen. It may perhaps also be related to HAECKEL'S *Auralia* (**88b** p. 301) but until the publication of his promised work "the Morphology of the *Siphonophorae*" nothing definite can be said of this relationship.

Angelopsis globosa Fewk. was captured by the Albatross at a depth of 1395 fathoms (about 2553 M.), *Auralia profunda* Hkl. seems to be also a deep-sea *Siphonophore* as are all the other *Auronectae* (*Stephalia*: 1170 and 945 M., *Stephonalia* 503 M., *Rhodalia* 1098 M.).

That the *Angelidae* (*Auronecta* Hkl.) sometimes come closer to the surface is indicated by the depths of 100 and 112 M. given for the stations 15 and 289 where our specimens were captured by the Siboga expedition. As the specimens were captured by trawl, they may of course have attached themselves, the trawl going up to the surface from the depths of 100 M. and 112 M. It seems therefore possible that *Angelidae* sometimes come near the surface of the sea and we agree with FEWKES (**89a** p. 149) that the extraordinary development of the pneumatophore and of the nectophores rather indicates life at or near the surface of the water.

Of our three specimens *Cat. 10 B.* (Pl. XVIII, fig. 139) is the smallest, the length of the pneumatophore measuring $4^1/_2$ mm., the greatest breadth 2,5 mm. The greatest breadth of the pneumatophore and the siphosome which is situated underneath the former is about 8 mm. It is the smallest *Angelid* which has yet been found, the pneumatophore of FEWKES' *Angelopsis* having a diameter of 7—10 mm. The appendages on the lower part, on the siphosome are very poorly represented by some very small buds. Our sketch was made after the specimen had been halved.

Cat. 10 A. (Pl. XVIII, fig. 137) belongs to the same station as Cat. 10 B., is much larger, the siphosome especially having increased in size. Fig. 137 of Plate XVIII was made after a photograph of the same and shows a voluminous muscular pneumatophore (length ± 6 mm., greatest breadth 4 mm. *pn.*) which bears apically some very well-marked pigment-spots; the lower part of the nectosome consists of radial muscular bands beginning immediately underneath the groove, which indicates the division between the float and that part of the nectosome which in the living state constitutes the place of attachment of the nectophores. That this is the case, we can still see by observing the position of the two nectophores which have still remained attached to the nectosome. (Pl. XVIII, fig. 137 *n*, *n*). Owing to the preservative fluid the two mature nectophores, situated to the left of the corm are perhaps not easily to be recognized as such. We will later on describe their exact position on the nectosome.

The siphosome of Cat. 10 A. shows a confused heap of appendages, out of which only a few siphons (Pl. XVIII, fig. 137 *s*) and some very large tentacles (Pl. XVIII, fig. 137 *t*) are to be recognized. It was absolutely impossible at first sight to give any definite place or name to all these appendages; we hoped to find out more of their exact nature when looking through the microscopic sections, but we have been in many cases sadly disappointed, the ectoderm and entoderm being nearly always entirely destroyed. The only appendages of which we will speak more fully are those situated on the opposite side of the nectophores (on the right side of our drawing).

Again quite different in outward appearance is *Cat. 22* (Pl. XVIII, fig. 138); the

pneumatophore (*pn.*) having attained a length of 10 mm., a breadth of 6 mm. It is very muscular, shows lines and furrows on its top which are simply thickenings of its outer wall. As it is flattened apically, it seems very much larger than in Cat. 10 A. We will speak later of the bunch of appendages situated to the right side of the flattened pneumatophore.

The lower part of the nectosome as in Cat. 10 A. shows itself as a well-marked muscular wall underneath the pneumatophore; it shows the same linear radial elevations as in Cat. 10 A. and seems larger in comparison to the breadth of the pneumatophore. But the appendages of the siphosome being less voluminous and abundant, may perhaps give the impression of its unusual dimensions. No nectophores are left.

The siphosome shows more or less the same appendages as HAECKEL **88b** gives on Pl. IV, fig. 15 for *Rhodalia miranda*. Not one appendage can be distinguished from the other; they constitute probably much contracted siphons and gonostyles. This specimen, preserved in formaldehyd 4°/₀, proved on section to be histologically even worse than the two others preserved in alc. 90°/₀.

As one can judge already by comparing the three sketches of the three specimens, there is no aurophore and we came to the conclusion that the bunch of appendages, visible in two sketches on the right side of the pneumatophore (in one on the left side Cat. 10 B.), could only be the zone of proliferation, the spot where the appendages, either nectophores or appendages of the siphosome, or both, begin their very first stages of development.

Not finding any appendage having the faintest resemblance to an aurophore on the other side of this bunch of elongate appendages, we decided to make sections of the three specimens, so as to get a clear idea of the real position of both pneumatophore and young appendages.

The three specimens were therefore stained with alum carmine and cut into sections of 15 μ thickness.

The respective numbers of sections made, were

for Cat. 10 A.	1143 sections,
for Cat. 10 B.	394 sections,
for Cat. 22	1597 sections.

The sections were all made in a longitudinal direction; so, that in the sketch made of 10 A. (Pl. XVIII, fig. 137) the whole specimen ought to be turned a little more to the right, the bunch of appendages thus coming more out of sight, the nectophores coming more in advance. Placed thus the section was made in the direction of the arrow.

In main points the sections of all three specimens agree; in minor details there are of course differences, but not important enough, to need different specific denominations. Histologically the material is very unsatisfactory, whole layers being destroyed. Especially Cat. 22, the formaldehyd specimen hardly shows any well-defined cells; the different cavities are filled with their remnants. After careful research and examination of the 1143 sections of Cat. 10 A. (which proved to be the best preserved and the best specimen fit for section) we were able to reconstruct the whole and we have come to the result that not only in *Archangelopsis*, but in all *Angelidae* (HAECKEL's *Auronectae*) there is no particular medusoid structure, no aurophore to be found in them. The so-called aurophore constitutes externally the

modified outer wall of the bunch of youngest appendages, and contains interiorly an apparatus identical to the airfunnel or pneumatochone of *Physonecta*. The ordo *Auronectae* as such has therefore no right of existence; its genera are to be considered as members of a family, FEWKES' *Angelidae* and the latter belongs again to the order *Physonecta*.

In nearly all textbooks of Invertebrate Zoology *Auronectae* are figured and described as a most remarkable order of *Siphonophora*. It will be seen how their importance has diminished as a result of our examination of the Siboga material.

A reconstruction of *Archangelopsis* is given on Pl. XVII, fig. 124. It is of course diagrammatic but constructed absolutely after the facts observed in the sections.

We have used different colours for the different layers: for the ectoderm we used the yellow colour, for the entoderm grey, for the intermediate layer, the hyaline cartilaginous fulcrum (the German "Stützlamelle") black, for the secondary ectoderm ("secundäres Ectoderm" CHUN) green and finally for the chitinous substance of the pneumatocyst black again.

It will now be seen that also in sections, no trace of an aurophore is to be found, that the bunch of appendages is situated on the same side as part of the pneumatophore. This part of the pneumatophore we consider as the proximal invaginated part (Pl. XVII, fig. 124 *pc.*) the air-funnel ("Lufttrichter" CHUN)[1]).

The voluminous distal part is the pneumatosaccus ("Luftsack") (Pl. XVII, fig. 124 *p. sacc.*).

Beginning from the lower part of the corm (*a. s.*) the ectoderm, being the most external layer, can be easily followed on the external side of the mature appendages (Pl. XVII, fig. 124 *a.s.*). Going up to the left the ectoderm is traced also along the outer wall of the bunch of young appendages (*b. a.*), which as we firmly believe, constitute together the zone of proliferation ("Knospungszone"). The outer wall of the pneumatophore is only a continuation of this same layer (pigment being profusely developed) and the ectoderm joins the outer wall again of the mature appendages on the basal part.

The course of the fulcrum or supporting layer is absolutely the same (Pl. XVII, fig. 124 *f.o.*). We will speak later of the communication by means of transverse septa (Pl. XVII, fig. 124 *s.a. α.*) which are found to exist between this supporting layer and the same in the air-funnel; transverse septa (*s. a. β.*) are also frequently found between the fulcrum of the pneumatocodon ("Luftschirm") and the fulcrum of the pneumatosaccus ("Luftsack") on the apical part of the pneumatophore.

1) In the adult structure one might be inclined to consider the pneumatosaccus as situated proximally to the more distally placed pneumatochone. When, however, we take into account that the pneumatochone is originally the invaginated apex of the pneumatocodon, our interpretation above given will appear to be justified.

Once and for all we should like to institute the following nomenclature of the different parts composing together the pneumatophore. Since HAECKEL's Report of the Challenger expedition they have often been wrongly applied.

The "pneumatophore" (Luftblase) consists of an outer wall "pneumatocodon" (Luftschirm), an invaginated interior sac, the "pneumatosaccus" (Luftsack), which is often divided into two sacs; the distal one retains the original name pneumatosaccus, the proximal one is called "pneumatochone" (air-funnel, infundibulum, Lufttrichter). The latter contains the so-called "secondary ectoderm" (pneumadenia HAECKEL, Gasdrüse CHUN), which should be considered as the remnants of an early extensive development of the original ectodermlayer of the yet undivided pneumatosaccus at its proximal part.

This ectodermlayer (as has been proved by Professor R. WOLTERECK in *Agalma Sarsii* 1905) develops in early stages a chitinous substance which later on constitutes the "pneumatocyst" (Luftflasche) of the pneumatophore. The pneumatocodon in the fully developed pneumatophore therefore consists of three layers: ectoderm, chitinous layer, entoderm; the pneumatosaccus of the same three layers but in inverted succession, the entoderm of the latter facing the entoderm of the former. The pneumatocyst consists only of one chitinous layer.

The entoderm (*eno.*) constitutes the internal layer and faces the pericystic cavity (*p. cav.*) ("Gastrovaskularraum" CHUN). When describing more accurately the anatomy in the different sections, we shall speak of it again.

These three layers constitute together not only the outward wall of the pneumatophore but also the body of all the appendages. Encircled in this exterior sac, is another one consisting of course of the same series of layers. As is universally admitted the pneumatosaccus constitutes the invaginated proximal part of the pneumatocodon, its entoderm therefore is to be found facing the entoderm of the pneumatocodon or outer wall and the ectoderm is originally situated on the opposite side lining the interior of the pneumatosaccus. On the opposite side of the bunch of young appendages, this entoderm, fulcrum and ectoderm can be easily traced, the pericystic cavity separating this pneumatosaccus from the pneumatocodon. On the side of the young appendages we find that the narrowed proximal part or air-funnel sinks more or less into the pericystic cavity and is dichotomously branched. Its supporting layer (*fac.*) corresponds in some sections with the fulcrum of the pneumatocodon. Its ectoderm especially at the base of these side-branches develops a great amount of secondary ectoderm, (*sec. exy*) which not only appears in the air-funnel, but passing through the pneumatopyle (Pl. XVII, fig. 124 *p. oy* "Trichterpforte") spreads along the interior wall of the pneumatosaccus (*exac*) attaining its greatest development near the pneumatopyle, gradually diminishing on both sides of the pneumatosac.

In Cat. 22 it continues altogether and lines the whole interior wall of the pneumatocyst. This will be more fully described later on.

In all three specimens the chitinous pneumatocyst constitutes the inner layer of the pneumatosaccus (in Cat. 22 accompanied by secondary ectoderm) and often fits into folds of the secondary ectoderm; this is only the case in the secondary ectoderm in the pneumatosaccus (Pl. XVII, figg. 126, 127, 128 *f. py*). It ends on both sides of the secondary ectoderm in two club-shaped enlargements (Pl. XVII, fig. 124 *c. py*).

As well as in the secondary ectoderm of other *Physonecta (Athorybia, Physophora)*, so well-described by CHUN **97a**, we found traces of the so-called giant-cells ("Riesenzellen") both on the proximal and in the more distally situated secondary ectoderm (*r. z. r. z.*). They are marked as small black granulations on Pl. XVII, fig. 135 *r. z.* Together with these gigantic cells circular cavities are found which are formed by the gas-secreting cells of the secondary ectoderm. Of these we shall also have occasion to speak later.

The diagrammatic sketch gives one a general idea of the structure of the pneumatophore of *Archangelopsis typica*, as we suppose it to be in the living state; it was made entirely from the sections. We shall now describe a few of these in their successive stages.

Histologically, as we said above, very little has remained well-preserved. We will therefore give again diagrammatic sketches. The first striking one is given on Pl. XVII, fig. 125 I (glass 10 III 8). We see to the left the bunch of appendages (*b. a.*) most of them being cut in longitudinal section. The ectoderm was almost entirely lost but has been added in the diagram for clearness' sake. That all these appendages (*b. a.*, *b. a.*) are not all cut longitudinally can be seen by the two circular ones to the left, which in the next sections are found to join the other appendages. It is also clear that the outer wall of the appendages passes apically

gradually into the outer wall of the pneumatophore (*po*) and becomes the outer wall of all the younger and mature appendages on the basal part of the corm. The chitinous layer of these appendages is continuous with the chitinous layer of an interior cavity indicated by a green colour. We find this to be the air-funnel (*p. c.*) and as we find a great many granulations in the interior of this cavity we suppose these belong to the giant-cells; the latter are again formations of the gas-secreting secondary ectoderm, and we think we are justified in supposing the cavity of the air-funnel to be filled up entirely by secondary ectoderm. The giant-cells in this first and in all other sketches are represented diagrammatically by small black dots. It is only in very few cases that we were able to find any contour to these cells. Some of these have been figured enlarged on Pl. XVIII, fig. 140.

The pericystic cavity is lined by an entodermal layer, which in the appendages has many folds. A magnified sketch (Pl. XVII, fig. 134) of one of these folds shows the extraordinary resemblance there is to the drawings given by HAECKEL of *Rhodalia* (**88b** Pl. V, fig. 27).

On the side of the pneumatosaccus we see (Pl. XVII, figg. 125—133 *p. sacc.*) of course first the entoderm, then the very irregularly shaped thick chitinous layer which in *Archangelopsis* seems to have attained extraordinary thickness.

The next layer is a chitinous one again which in this first sketch does not lie quite against the elongated strip of secondary ectoderm. It constitutes the pneumatocyst; the folds of this layer into the secondary ectoderm would perhaps suggest that also in this point *Archangelopsis* is primitive. As is said in the note on p. 94 the secondary ectoderm originally in many instances secretes a chitinous layer (see WOLTERECK **1905**) and it seems we find this primitive stage again in the cushion-like secondary ectoderm of our specimens. Of course it may also be a result of contraction of tissues but we found the same in our three specimens of *Archangelopsis* (Pl. XVII, fig. 126 II *f. py.*, fig. 127 III *f. py.*, fig. 128 IV *f. py.*).

In the other sketches (Pl. XVII, figg. 126—133 II—IX) we have left out the young appendages. We sketched only the air-funnel, showing here and there the transverse septa which connect it with these appendages (II, IV, VI, etc. *s. a. α*) and part of the pneumatocodon on the right and left sides of this air-funnel.

The second diagram (Pl. XVII, fig. 126 II) thus shows the outer wall or pneumatocodon (*p. o.*) on both sides of the now dichotomously branched air-funnel. A septum (*s. a. β*) connects the pneumatocodon and the pneumatosaccus, and is, as is seen by its position, different from the one indicated in Pl. XVII, fig. 125 I.

The air-funnel has not only become branched but has also increased in size, as is shown by the outer wall of the pneumatosaccus, coming closer to the entoderm of the opposite side. The ectoderm of the branched part was in some parts well-preserved and proved to consist of many layers in its basal part. In this part, quite near to the thick ectodermal layers we see the first appearance of a chitinous substance; the ectoderm consisting of more than one layer has probably contributed to the formation of this chitin. In the air-funnel we find again granulations, the divided nuclei of giant-cells and secondary ectoderm. The secondary ectoderm (*sec. exy.*) facing the interior cavity or pneumatosaccus has increased in size as compared with sketch I, but preserves its elongate cushion-like appearance. It contains also cavities filled with granulations,

which we suppose to belong to the same giant-cells as those in the air-funnel. In one of its folds we find the chitinous layer (*f. py.*) enveloped by the secondary ectoderm.

Further on (on glass 11 III 3 sketch fig. 127 III) we find that the air-funnel has preserved its branched appearance and comes into closer connection with the opposite side, the wall of the pneumatosaccus. This happens by the union of the chitinous layer of the former with the chitinous layer of the latter. The entodermal layers have united too and continue in one unbroken line. The air-funnel contains the same chitinous substance imbedded in its lower part. This substance is more voluminous and becomes also dichotomously branched. The secondary ectoderm with the chitinous substance in its folds, the remnants of giant-cells both in the secondary ectoderm of air-funnel and pneumatosaccus have remained the same as in sketch 125 II. There is no septum connecting pneumatocodon and pneumatocyst.

In sketch IV (Pl. XVII, fig. 128 glass 11 III 7) the fulcrum breaks through and we find now a definite continuation of the wall of the pneumatosaccus and the pneumatochone. This aperture appears suddenly, the chitinous layer gets thinner and from one section to the next (glass 11 III 6—11 III 7) the breaking takes place.

The other layers follow the ectoderm of the air-funnel meeting the same layer of the pneumatosaccus; the same is the case with the entoderm and the fulcral layer. Also in this sketch the ectoderm in the lower part is supposed to consist of many layers. Lying immediately against it we find that the chitinous substance in the air-funnel is distinctly branched, ends on both sides in two club-shaped enlargements (*c. py.*) which are connected by a thin thread-like stripe of chitinous substance. This stripe or ribbon faces now the chitinous ribbon of the pneumatosaccus.

Between those two club-shaped enlargements and also on the proximal side fusing with the ectoderm, which is situated at the bend of the two side-branches, we find a tissue which we cannot identify entirely with the secondary ectoderm. It is of course very much altered by preservation, but seems to us to contain fibrous substance intermingled with secondary ectoderm cells. They constitute, therefore, probably the matrix-cells of these thick, hard, chitinous club-shaped enlargements. We have on purpose given them the same colour as the secondary ectoderm, though somewhat darker, but the boundaries of these cells are not clear in any of our sections; the demarcation between the light and the darker green is therefore to be considered an absolutely hypothetical one. In sketch IV (Pl. XVII, fig. 128) there are no further pecularities, except for the occurrence of a new septum between pneumatocodon and pneumatocyst.

Sketch V (Pl. XVII, fig. 129 V) was taken from a section immediately following the one from which we tried to reconstruct the whole in the diagrammatic fig. 124 of Plate XVII. It needs therefore little explanation. A further connection of the air-funnel and the pneumatosaccus has now arisen by the union of the inner chitinous layer of the latter with the club-shaped enlargements especially with their connecting band.

We have now come to the stage which makes the resemblance of this pneumatophore a striking one to those described and figured by Chun **97a**. A comparison of the sketch V of Plate XVII, fig. 129 and fig. 124, Plate XVII with Chun's figures given of the pneumatophores of *Physophora* and *Athorybia* shows how easy it has now become to reconstruct the structure

of the pneumatophore of *Angelidae* and how this family fits in quite with the others in the order *Physonecta*. The pneumatocyst has now its definite shape and the region situated proximally to the club-shaped enlargements ("Chitinring") constitutes the pneumatopyle or "Trichterpforte".

The position of the young buds of appendages is of course different from that of the mature ones, the former being situated on both sides of the air-funnel, the latter having a position on the right side of the pneumatophore. It is clear that if ever *Archangelopsis* had shown a porus as in *Rhizophysa*, this would have been on the opposite side of the bunch of appendages. That is why we consider the appendages to be on the right side of the pneumatophore. But it may be possible that those situated on the more, so to say, "apical" part are young buds of future nectophores, those situated on the lower, basal side perhaps develop into appendages of the siphosome.

We hope that our conception of the structure of the pneumatophore in *Angelidae* will also remove the difficulties which Chun mentions (**97a** p. 76). He says that when in *Siphonophores* the stem is shortened the appendages are situated in the neighbourhood of the air-funnel and that the principal axis of the primary siphon corresponds with the same in the air-funnel. It seems to us that this difficulty no longer exists.

To continue our description of sketch VI (Pl. XVII, fig. 130 VI) we may add that the secondary ectoderm of air-funnel and pneumatosaccus have melted together. In this secondary ectoderm small clefts (*cav. sec.*) are to be seen, which correspond exactly to those sketched by Chun in *Physophora* called by him "Spalträume im Lufttrichter". They occur both in the cushion-like elongated secondary ectoderm tissue of the pneumatosaccus and in the same tissue in the air-funnel. They are distinctly different from the cavities occasioned by the more or less empty giant-cells.

These clefts are also found again in sketch VII (Pl. XVII, fig. 131 VII) and have a more rounded appearance; it seems as if a porus were being formed in the secondary ectoderm. In fig. VIII (Pl. XVII, fig. 132) one sees yet a further communication inside, going deeper into the air-funnel. It is of great importance that the cavities thus formed are always circular and that in sketch VIII there are three such cavities situated one above the other. We are fully convinced that they are cavities created by the accumulation of gas in the secondary ectoderm. It is a known phenomenon in other *Physonecta* (see Chun **97a**, sketch of *Athorybia* Pl. IV, fig. 7). In our sketches these cavities have just been halved and constitute therefore no real opening. We compare with this sketch the transverse section of *Angelopsis globosa* given by Fewkes (**84** see our fig. 136 of Pl. XVIII). It is now clear that the opening ("*o*") of the bud (*g. m.*) into the float is simply such a circular cavity and that the surrounding tissue which was drawn purposely distinctly clearer amidst darker surroundings constitutes the cushion of secondary ectoderm.

A further proof of the great probability of this interpretation of the opening "*o*" is the fact of our having seen, when making the same transverse section through the three specimens of *Archangelopsis*, exactly the same black opening "*o*" its surrounding light coloured area on a darker back-ground, accompanied this time by one more opening. This opening corresponds to the cavity formed by the secondary ectoderm on the left in the cushion-like part (sketch VII),

the connection being visible in sketch VIII (*o*). In this same sketch VIII we find that these three cavities are gradually diminishing in size, the most proximal one being already closed and the resemblance with the secondary ectoderm of *Athorybia* and such a cavity formed by this ectoderm as figured by CHUN (**97a** on Plate IV, fig. 7) is a very striking one.

Finally the last sketch IX (Pl. XVII, fig. 133 IX) shows how the cavities have partly disappeared, the most distal one being the only one left. In sketches VI—IX we have seen an increase of the developing chitinous substance in the cushion-like secondary ectoderm. This substance corresponds perhaps to the darker green colour situated between the two chitinous enlargements.

As we said already above, we tried to get a more definite idea of the structure of the appendages, but by reason of their histological insufficiency we had to give up this examination entirely.

The sketch of the mature appendages in the diagram of the whole, may perhaps seem deceptive, as on the left near the air-funnel the bigger siphons are drawn, and on the opposite side the smaller ones. It would seem therefore that they develop on the side opposite the one we found to be the zone of proliferation. To explain this apparent mistake we may add that an enormous quantity of appendages (which would have filled up at least one more plate underneath the diagram (Pl. XVII, fig. 124) could not be added. That the siphon on the left side has probably been cut right through the middle, whilst the others on the right are only touched superficially which accounts also for the appearance of the two ovate bodies on the basal side. The two nectophores have not been included in the diagram, they develop themselves in the outer wall, about the same height as the furthest appendage (*a.s.a.*) shown on the diagram.

After the description of the internal structure of *Archangelopsis*, we think it no longer difficult to remould HAECKEL's *Auronectae* in such a way as to make the homology between zone of proliferation and air-funnel on one side and aurophore on the other a striking one.

If we compare HAECKEL's longitudinal section of the aurophore of *Rhodalia* on Pl. V, fig. 24 of his Challenger Report with the series of sections given on Pl. XVII of this work, we find that by diminishing the fulcrum ("*z*" on Pl. V HAECKEL **88b**), the ectoderm follows the folds of the entoderm on the other wall; they become the youngest buds of appendages. The pericystic cavity in HAECKEL's *Rhodalia* continues (the porus being accidental) and the entoderm on the opposite side constitutes one of the layers of the pneumatosaccus.

The irregular folds correspond to the buds of youngest appendages.

The outer ectodermal layer also runs smoothly along the "spherical bag-like structures" in FEWKES' *Angelopsis globosa*. FEWKES has already seen in the cavity of one of them "bodies resembling those of the lower floor" i. e. appendages of the siphosome (**84** p. 973). This means that FEWKES suspected that the internal structure was more complicated than he could at that time conceive. We believe that both HAECKEL's *Auronectae* and FEWKES' *Angelopsis globosa* were in a different state of contraction from ours, and that the latter represent by far the most natural condition.

Subordo Rhizophysaliae Chun 82.

Fam. Rhizophysidae Brandt 35.

Rhizophysa Pér. et Les.

So far as we can judge by the litterature of *Rhizophysidae* we can only accept two species, *Rhizophysa filiformis* Forsk. **1775** and *Rhizophysa Eysenhardti* Ggbr. **60**. We cannot admit the validity of any of the new genera which Haeckel has proposed (*Cannophysa*, *Linophysa*, *Aurophysa*, *Pneumophysa*, *Nectophysa*); their characteristics are based on differences too slight to permit us to look upon them as more than two species of the same genus.

Haeckel also often repeats that he will describe the specimens in a future work (see **88b** *Pneumophysa* p. 328). His descriptions of *Aurophysa* and *Linophysa* are quite insufficient. *Cannophysa* and *Nectophysa* have been treated somewhat better, but we cannot find any difference from the original *Rhizophysa Eysenhardtii*, looking through the description of *Cannophysa Murrayana*, from *Rhizophysa filiformis* or comparing it with *Nectophysa Wyvillei*. Haeckel writes simply of the latter (**88b** p. 327) "Another closely allied species seems to be *Rhizophysa* "*Eysenhardtii* described by Gegenbaur".

Forskål was the first who described a *Rhizophysid* from the Mediterranean which he called *Physophora filiformis*. Péron and Lesueur **1807** found *Rhizophysa planistoma* in the North Atlantic, which seems to be identical with the former. Gegenbaur **54** gives a very accurate description of a *Rhizophysa* and in his paper we find for the first time well-drawn figures of the tentilla. He finds three types of these appendages: 1) the trifid with an odd median lobe and two paired lateral horns, 2) the palmate, 3) the tentilla compared by Gegenbaur to a bird's head, the latter being very rare, as Gegenbaur only found them once in ten specimens of *Rhizophysa filiformis*.

These three kinds of tentilla were found again by us in the Siboga material. Those *Rhizophysidae*, which showed one of the three types mentioned above or only a stage of development of one of these, belong to *Rhizophysa filiformis*, whilst those with only thread-like tentilla were identified with *Rhizophysa Eysenhardti*. Finally one *Rhizophysid* (Cat. 75 A. Stat. 194—197) where the tentilla had probably become detached was found amongst the material. We indicate it as *Rhizophysa* spec. and it is of no particular value.

55. *Rhizophysa filiformis* Forsk. Pl. XVIII, figg. 141—145; Pl. XXI, figg. 151, 152.

= *Physsophora filiformis* Forsk. 1775.
= *Rhizophysa planistoma* Per. et Les. 1807.
= *Rhizophysa filiformis* Ggbr. 54.
= *Rhizophysa filiformis* Fewk. 79.
= *Rhizophysa gracilis* Fewk. 81.
= *Rhizophysa filiformis* Hkl. 88b.
= *Cannophysa Murrayana* Hkl. 88b.
= *Cannophysa Eysenhardtii* A. G. Mayer 93.
= *Rhizophysa Murrayana* Ch. 97a.

Stat. 50. Bay of Badjo, West-coast of Flores up to 40 M. *Cat.* 166 A., 166 B. formald. 4°/₀. 2 specimens.

Stat. 92. Lat. 3° 7′ N., Long. 119° 22′ E. Depth 3975 M. *Cat.* 15 A., 15 B. formald. 4°/₀. 2 specimens.

Stat. 97. Lat. 5° 48′.7 N., Long. 119° 49′.6 E. Depth 564 M. *Cat.* 1. One specimen, on cable.

Stat. 113. Lat. 1° 37′ N., Long. 122° 37′ E. *Cat.* 152. formald. 4°/₀. One specimen, on cable.

Stat. 165. Anchorage on North-east side of Daram-island (False Pisangs), East-coast of Misool. Depth 49 M. *Cat.* 148 A. alc. 90°/₀. One specimen.

Stat. 184. Anchorage off Kampong Kelang, South-coast of Manipa-island. Depth 36 M. *Cat.* 68. formald. 4°/₀. One specimen.

Stat. 223. Lat. 5° 44′.7 S., Long. 126° 27′.3 E. Depth 4391 M. *Cat.* 18, 170. formald. 4°/₀. 2 specimens, on cable.

Rhizophysa filiformis was represented by ten specimens, the smallest (Cat. 148 A.) measuring about 8 mm., the largest (Cat. 18) showing a stem of 63 cm. length. Between these two extremes we find specimens whose stem have a length of 6 cm., 9 cm., 22 cm., 45 cm. All these measures are taken from the top of the pneumatophore to the base of the most distal siphon, the specimen being taken out of its preserving fluid, because the stem stretches itself by the weight of the siphons and other appendages. In many cases we had the greatest difficulty in disentangling the stem and it often happened that it broke off, but judging by the consecutive stages of development of the gonodendra we were able in most cases to reconstruct the whole. There is no doubt that the specimens attained a much greater length in life.

We decided to make sketches of only two specimens as the others are not well enough preserved. They are Cat. 166 A. (length pneumatophore to base of oldest siphon 9 cm.) and Cat. 18 (length top pneumatophore to most distal part of the stem 63 cm.).

In *Cat. 166 A.* (Pl. XVIII, figg. 141, 142) the length of the pneumatophore is $2^1/_2$ mm., its greatest breadth $1^1/_2$ mm. It is oval; the hypocystic villi (Haeckel) are visible through its outer wall. Pigment is also present near the porus, but has probably lost much through preservation. The wall of the pneumatophore continues immediately into the wall of the stem. There the buds of the siphons are to be found in successive stages of development. Some of them show already another bud at their base, the future tentacle. This appendage is to be seen first at the base of the sixth young siphon; its tentilla are not developed. These begin their development near the base of the eighth siphon, and each succeeding siphon shows a more mature, more extended tentacle with more and more numerous tentilla. These are all trifid, very young stages we believe, but still clearly to be recognized as such. A single tentillum (Pl. XVIII, fig. 142) is thus composed of an odd median lobe with large cnidocysts in the centre, smaller ones near the top, and of two small lateral filaments. Judging from their small size we are inclined to think they are not mature. The cnidocysts in these filaments are of the same shape and size as those near the top of the odd median lobe.

The tentilla which Chun **97a** calls "vogelkopfähnlich" are entirely wanting in this specimen. Gegenbaur found them to be exceedingly rare as he found them only once in ten specimens. Chun however finds that especially in young specimens beak-like tentilla only occur and that together with the greater development of the specimen, other kinds of tentilla are formed and that the alteration from one type to the other occurs on the same tentacle. In the Siboga material

we found, however, these beak-like tentilla only in the very oldest specimen (Cat. 18), whilst all the other specimens showed the trifid type and the palmate. So judging from our material we conclude that the beak-like are not the very oldest tentilla, those which develop first on the stem. But we cannot come to any definite conclusion, as after all preserved material of *Siphonophores* is the very worst for deciding the question of larval stages. We simply describe the facts, leaving it to future investigators, who are fortunate enough to examine fresh material, to decide these important questions.

Between the ninth and tenth, and the tenth and eleventh siphons two gonodendra are developed which have already the characteristic shape and are easily recognized as such. Younger gonodendra than these two could not be distinguished from the other buds.

Cat. 18 (Pl. XVIII, fig. 143—145, Pl. XXI, figg. 151, 152) was very much entangled when we found it amongst the Siboga material. The middle-part of the stem had absolutely wound round the proximal part near the pneumatophore. Moreover tentacles, tentilla and siphons had clung so tightly around the twisted double stem that it was only with the greatest difficulty that we succeeded in disentangling it all, at the cost of a few tentacles and siphons. But we managed after all to get a complete stem, in which the appendages show their development at regular intervals. It has now a length of 63 cm.

The pneumatophore (long 9 mm. broad 6 mm.) shows no irregular shape, it has the same structure as GEGENBAUR describes for *Rhizophysa filiformis.*

The stem narrows suddenly immediately below the pneumatophore; it has then an absolutely thread-like appearance which it keeps all along but for some irregularities in its distal part. Near the pneumatophore we find a cluster of buds of siphons and five young siphons. Then follows a short space where already the gonodendron can be distinguished as a very young spherical swelling on the stem. Remains of tentacles also are still situated on that part.

The further part of Cat. 18 shows 22 siphons which have partly lost their tentacles (e. g. the third, the fourth, etc.). A small stump at the base of these siphons shows, however, where they have been attached to the stem. The tentilla are well developed; we found again the three types GEGENBAUR originally observed. Especially the trifid type is well preserved (Pl. XVIII, figg. 143, 144); the palmate tentillum has undergone much alteration but still its shape is easily recognizable. The appearance of irregular hard white granules makes it easy to find these tentilla on the stem. What the significance of these hard (? calcareous) granules is, has not yet been discussed.

The third type (Pl. XVIII, fig. 145) can with a little difficulty be identified with GEGENBAUR's figure (**54** Pl. XVIII, fig. 9). The beak instead of standing straight out is bent to the proximal part of the tentillum, its point being covered over by the numerous threads of exploded nematocysts which arise on the ventral part.

We found only a few of this last type and we cannot say anything definite as to the exact position of the tentilla on the stem, as we often found detached tentacles, even detached tentilla on the naked parts of the stem. Gonodendra are present in every stage of development. Between the ninth and the tenth mature siphon we find the most developed one, after the eleventh only the basal part of the stalk (gonostyle) is left, the gonodendron itself being detached.

Between the 11th and 12th siphon the stem is devoid of any appendages. But as this interval is longer than can be the case in a normal living *Rhizophysa* we suppose either that the stem has considerably stretched or that appendages are lost.

56. *Rhizophysa Eysenhardti* Ggbr. Pl. XX, fig. 147; Pl. XXI, fig. 150; Pl. XXIV, fig. 172.

= ? *Rhizophysa filiformis* Huxl. 59.
= *Rhizophysa Eysenhardtii* Ggbr. 60.
= ? *Rhizophysa inermis* Studer 78.
= *Rhizophysa Eysenhardtii* Fewk. 83.
= *Nectophysa Wyvillei* Hkl. 88 b.
= *Rhyzophysa Eysenhardtii* Ch. 97 a.

Stat. 119. Lat. 1° 33'.5 N., Long. 124° 41' E. Depth 1901 M. *Cat.* 19. formald. 4°/₀. One specimen.
Stat. 208. Lat. 5° 39' S., Long. 122° 12' E. Depth 1886 M. Deepsea trawl. *Cat.* 14 A., 14 B. (detached appendages probably of Cat. 14 A.), 17 A., 17 B., 17 C. (detached appendages either of 17 A. or 17 B.), 20 A., 20 B. (detached appendages probably of 20 A.). formald. 4°/₀. Total 4 complete specimens.
Stat. 215. Sounding due West, 1300 M. distant from the North-point of Kabia-island reef. Depth 701 M. Reef-exploration. *Cat.* 96. formald. 4°/₀. One specimen, Cat. 169 detached appendages of Cat. 96.

The specimens of *Rhizophysa Eysenhardti* do not differ from *R. filiformis* as far as their mode of preservation is concerned. We also found in these specimens that very often the stem is twisted in such a way as to make it exceedingly difficult to disentangle it. The stem often breaks off and the different parts have to be reconstructed, the size of the gonodendra being the only guides. The length of the different stems in the specimens measure:

Cat. 96	18 cm.
Cat. 19	20 cm.
Cat. 20 A.	50 cm.
Cat. 17 B	55 cm.
Cat. 14 A.	136 cm.
Cat. 17 A.	140 cm.

We only give sketches of Cat. 20 A. and Cat. 14 A. as they are the most important. Cat. 96 resembles absolutely *Rhizophysa filiformis* Cat. 15 A. but for the shape of the tentilla. These resemble exactly the tentilla Huxley **59** describes and figures for a *Rhizophysid* which he wrongly called *Rhizophysa filiformis*. There is, however, no reason not to identify this specimen with Gegenbaur's *Rhizophysa Eysenhardtii*. It is a remarkable coincidence that Huxley also found his specimen in the Indian Ocean. Haeckel's *Nectophysa Wyvillei*, probably also a true *Rhizophysa Eysenhardti* was caught near the Canary Islands (Lanzerote). Cat. 19 does not differ actually from Cat. 96.

Cat. 20 A. (Pl. XX, fig. 147) is in so far interesting as it is a very complete specimen.

Its pneumatophore surpasses in size even the measures given by Chun (**97a** p. 79). He finds a *Rhizophysa filiformis* whose pneumatophore has a length of 12 mm., a breadth of 11 mm. He writes that these are dimensions which have only been surpassed by *Bathyphysa Grimaldii*, whose pneumatophore in the largest specimen, as Bedot tells us **93**, measures 17 mm.

Our specimen has a pneumatophore of 18 mm. in length, and 11 mm. in breadth. We

shall see in *Pterophysa* how small these measures are in comparison with those of *Rhizophysa*. In Cat. 20 A. it is pear-shaped, it bends somewhat towards the stem, probably an abnormal condition through preservation. Where it changes into the stem, there is no real distinction between the two. Pigment is not very distinctly preserved, it has been lost probably through preservation. Immediately behind the pneumatophore the siphons are to be seen, budding from the stem, and very soon we also see tentacles with tentilla and young gonodendra. These first show themselves as small cone-shaped excrescences on the stem but these gradually grow and between the nineteenth and twentieth siphons the gonostyle is fully developed and the nine male and one female gonophores together with the gonopalpon on each side-branch of the gonostyle are differentiated. These latter all increase gradually in size and the most posterior gonodendron is one beautifully-shaped bunch of these appendages.

The first part of the stem (12 cm.) shows us also how the stem is broad, more or less swollen and transparent. It shows in this proximal part nearly everywhere the same breadth. This changes suddenly in the distal part, where probably not only many gonostyles, but also siphons and tentacles have become detached. We suppose that the first part is somewhat contracted and that the more normal condition is that of the distal one. The proximal part has about 27 siphons sitting closely one next to the other, the largest attaining a length of $2^1/_2$ cm. Every siphon shows a tentacle at its base, or the remains of one, when it has become detached. The tentilla show the structure characteristic of *Rhizophysa Eysenhardti* (Pl. XXIV, fig. 172).

The stem of the distal part (38 cm.) is nearly thread-like, it possesses fourteen siphons, situated at considerable distances one from the other. They are much smaller, but do not differ in structure from those in the first part. They all possess a tentacle with tentilla, or remains of a tentacle at the base. Gonodendra have probably all become detached, in some cases only the basal part of the gonostyle is to be seen.

Cat. 17 B. resembles in shape more or less Cat. 20 A. It also shows a proximal (20 cm.) part in which the stem is broader and a distal (35 cm.) part where the stem is thread-like.

We have given a sketch of *Cat. 14 A.* (Pl. XXI, fig. 150) to show what the aspect of a *Rhizophysa Eysenhardti* is which measures 136 cm. and which but for the small cluster of young siphons under the pneumatophore, has a stem of absolutely thread-like appearance; it carries 25 siphons at irregular intervals; in its distal part some have fallen off. They are small, compact, probably all contracted through preservation. Between the 15^{th} and 16^{th} there is a protuberance on the stem which means probably that there too a siphon has been detached. No well-developed tentacles nor tentilla are preserved, but we still found distinctly the tentilla characteristic of *Rhizophysa Eysenhardti*. The gonodendra are all situated in the internodes between two siphons. Their development from simple bud to mature bunch (in this specimen the last two gonodendra show a very long thin gonostyle) can be followed along the stem.

Finally Cat. 17 A. (length 140 cm.) shows the same shape of the pneumatophore, stem and siphons in Cat. 14 A. The stem, if possible, is yet thinner and more thread-like. A great many appendages have become detached, so that the distal part, about 45 cm. is devoid of any appendages.

Fam. BATHYPHYSIDAE nobis.

Bathyphysa Studer 78.
Pterophysa Fewkes 84.

STUDER **78** described fragments of a huge *Siphonophore* which seemed to be new to science and which he called *Bathyphysa abyssorum*; the name indicates that they came from a considerable depth (1780 fthms and 1000 fthms).

After disentangling a great number of siphons and tentacles he managed to get free a pneumatophore and a stem of about one meter length. The former (length 19 mm.) had burst; through its outer wall the pneumatosaccus projected, only attached to the inner wall near the sphincter of the porus.

In a more complete sketch of this same pneumatophore belonging to STUDER's original material, which Prof. F. EILH. SCHULZE of Berlin was kind enough to have made for us (Pl. XXIV, fig. 166) we find that there are certainly no hypocystic villi near the base of the pneumatosaccus, as K. C. SCHNEIDER **98** thought there might be.

The stem could be divided into two parts, a long spirally wound thin part (length 60 cm., breadth only 3 mm.) in which no traces of appendages ("Zoiden") could be found. The distal part (40 cm.) was flattened, cylindrical, had a breadth of 3 cm. and on the convex side STUDER found the spots where the appendages used to be attached. There are first alternate rows of zooids; these gradually change into one row. This was the only part of the stem which he could isolate. All the tentacles and siphons which were wound around it, were detached. A part of another stem showed him how these siphons were actually situated on the stem.

Fig. 38 and 39 of Plate III of his work show a siphon hanging on a kind of stem, but what the long thread-like appendage might be, we could not decide. They were wound around the stem in a way which suggests a tentacle rather than the long stalk of a siphon. Fig. 27 of the same plate shows us, however, that the siphons are indeed provided with such long stalks. We wanted to convince ourselves of the fact and through the kindness of Prof. F. EILH. SCHULZE we were able to compare a siphon of STUDER's original material with his sketches and we came to the conclusion that *Bathyphysa* actually possesses long-stalked siphons. The siphons possess moreover wing-like appendages on the right and left sides, which are little developed. The "erbsengrosse Anschwellungen" which STUDER mentions as being present on the stalks we could not find in the specimens which were sent to us. The aspect of *Bathyphysa abyssorum* as STUDER reconstructed it (Pl. III, fig. 28) is therefore probably very near the truth.

Another difficult point was the total absence of any appendages or even protuberances on the proximal part of the stem. This we thought could not be possible, as over a length of 60 cm. there ought to be some small trace left. As it was not possible to get the entire material of STUDER, Prof. SCHULZE kindly had some sketches made, which are taken in the same position as Pl. III, figg. 23, 23 of STUDER's work. And we can only confirm STUDER's statement of the total absence of any swelling on this part of the stem. The stem is exceedingly twisted and contorted and but for a groove running along in the median line probably throughout its

whole length, there is nothing particular to be seen. We therefore do not understand why in the reconstructed figure of *Bathyphysa abyssorum* (Pl. III, fig. 28) STUDER does figure appendages along the upper part, although he seems to think that no nectophores can have been developed as traces of the latter would have been left.

Finally STUDER finds detached "deckstückartige Gebilde" (Pl. III, fig. 25) which are siphons, the wing-like excrescences of which have increased in size. We identify these with the younger siphons, whose stalk has probably not yet been developed. And we furthermore suppose that the thread which STUDER sketches at the base of these young siphons (Pl. III, fig. 25) is a young tentacle. We will return to this subject whilst describing *Bathyphysa Sibogae* nov. spec.

Of great interest is also *Rhizophysa conifera* Studer **78** as it is very nearly related to *Pterophysa grandis* Fewk. We agree with K. C. SCHNEIDER **98** who calls STUDER's specimen *Pterophysa conifera*. FEWKES **84** does not understand how it is possible that by making the transverse section of one of the polypites as is represented on STUDER's Pl. I, figg. 1, 2, or 4 he gets a structure such as is shown in Pl. II, fig. 18. He forgets however that STUDER did not himself make the sketches of the entire specimen (Pl. I, figg. 1, 2) and that we may expect differences in shape between the younger white coloured siphons and the older, white, yellow and black coloured ones. The transverse section has assuredly not been made through such an older siphon; there is every reason to believe that he used one of the smaller, younger ones.

We will show how in *Pterophysa grandis* young siphons have very strongly developed ptera and how these gradually disappear in proportion to the increase in age of the more distally situated ones.

We will also describe later on how in the very oldest siphon no trace of wings is left and how the siphons then absolutely resemble STUDER's figure 4*pf*, Plate I.

According to STUDER (p. 9) the siphons have an exceedingly small stalk by which they are attached to the stem. He speaks of the basal part of the siphon which is somewhat narrow and becomes "stielartig".

We therefore suppose that there are short-stalked siphons in *Rhizophysa conifera*, but of course we cannot say for certain whether this pedicle really continues to grow in older specimens, so as to become as large as those in *Bathyphysa abyssorum*. According to this statement, we might suppose that there is some relation between *Bathyphysa* and *Pterophysa*.

FEWKES **84** writes that STUDER's *Rhizophysa conifera* probably belongs to his new genus *Pterophysa*, on account of the possession of longitudinal bands in the siphons. He describes these bands (ptera) and gives some excellent figures of one of its siphons. In the text we find that tentacles were wholly absent. We were able to examine a very much twisted specimen of *Pterophysa* which was not the original belonging to the U. S. Fish Commission, but was identified by FEWKES himself and was published in A. AGASSIZ' "Blake" report. Here we certainly found tentacles, situated at the base of the siphons. The siphons were sessile; not the smallest indication of a stalk was to be seen.

Pterophysa grandis is therefore characterized: by the ptera on the lateral sides of the siphons, by the development of long tubular tentacles and by the absence of any stalk at the base of the siphons.

Whether Fewkes found any hypocystic villi near the base of the pneumatosaccus we cannot make out, as he gives no description of them. On the whole his description is far from complete.

Bedot **93** gives a short description of a new *Bathyphysa*, differing slightly from Studer's specimen; he called it *Bathyphysa Grimaldii*. We rather incline to think Bedot's specimen identical with Fewkes' *Pterophysa*, although of course minor differences are there. The main point however: absence of any stalk at the base of the siphons makes it clear, that the *Bathyphysa Grimaldii* of Bedot must be changed into *Pterophysa Grimaldii*. In 1903 Bedot gives a more extensive description of the same specimen and corrects at the same time some mistakes made in 1893.

The so called "pneumatozoids" are looked upon by Schneider **98** as undeveloped polypites. Bedot tries to show (**1903** and **1904**) that they are structures with a very different function from ordinary siphons. He finds at the base of the pneumatozoid a complicated structure consisting of a muscular shield externally, and a long, pigmented elastic band internally which runs along the ventral side of the pneumatozoid and loses itself in its proximal part. At the base of the siphon it is attached to the inner wall by the union of five entodermal bands. The whole apparatus is of unknown function. Bedot, however, does not say, whether they also occur in the siphons, and where the actual development of these pneumatozoids begins.

The most important point as Bedot says (**1904** p. 22) is that there is no mouth-opening in the pneumatozoid. But he forgets that in all young, immature siphons the aperture does not exist, as they do not yet exercise their function. In the description of a very large *Pterophysa* of the Siboga expedition we shall show how in the pneumatozoid-like young siphons the mouth-opening does actually exist in very young stages. It seems singular indeed, that in all our specimens of *Pterophysa* we looked in vain for the apparatus which we have mentioned above. We made microscopical sections of the base of siphons in different specimens but there was not the slightest indication of any such structure.

Pterophysa Fewk.

57. *Pterophysa grandis* Fewk. Pl. XIX; Pl. XXIV, figg. 167—170.

= *Pterophysa grandis* Fewk. 84.

Stat. 52. Lat. 9° 3'.4 S., Long. 119° 56'.7 E. Depth 959 M. Deep-sea trawl. *Cat.* 8. formald. 4°/₀. One specimen.

Stat. 185. Lat. 3° 20' S., Long. 127° 22'.9 E. Manipa-strait from 1536 M. to surface. *Cat.* 94 A., 94 B. (detached appendages of 94 A.). formald. 4°/₀. One specimen.

Stat. 284. Lat. 8° 43'.1 S., Long. 127° 16'.7 E. 828 M. Deep-sea trawl. Net torn. *Cat.* 21 A., 21 B. (detached appendages of 21 A.). formald. 4°/₀. One specimen.

Fewkes complained that the larger specimens of *P. grandis* are "hopelessly twisted" (**84** p. 970) and it seems to us a pity that he never tried to get any clearer idea of the real structure of these large ones. We too were in the same situation, but after many hours of patient endeavour, we managed to get one specimen (Cat. 8) which can be said to be absolutely complete, and two incomplete parts (the pneumatophore was wanting) (Cat. 94 A. and 21 A.) which as they appear to us now, are still of much value.

Cat. 8 (Pl. XIX) has a length of 377,3 cm., a length hitherto unknown for *Siphonophores*.

When we were unravelling the stem, it often happened that it snapped off, but we were able to reconstruct the whole, as the appendages, especially the gonodendra show a very slow but very gradual development. We were thus enabled to put together those parts in which the stages of development revealed the successive steps. Especially in Cat. 8 this succeeded remarkably well.

We should have liked to publish a sketch of the whole, but as the specimen is too large too be sketched on one plate (Pl. XIX) we left out parts which do not show anything particular in their development, and could easily be left out, without disturbing the harmony of all the gradual stages of development of the appendages. We call the different loops in which we laid the stem as it is represented in our drawing on Pl. XIX A., B., C., D., E., F., G.

Between C. and D. 15,5 cm. of the stem and its appendages are left out, between D. and E. 42,5 cm., between E. and F. 49,3 cm., between F. and G. 31,5 cm. Of course these measures are not quite exact, as the stem is in some places spirally wound, or contracted owing to the preservative fluid. To give a general idea of the structure of this large specimen, we will not only describe the parts drawn on Pl. XIX but also the intermediate parts.

A. The first part has a length of about 26 cm. The pneumatophore (length 2 cm., breadth $^1/_2$ cm.) is elongate, cylindrical, seems abnormally small for such a long siphosome (compare with *Pterophysa (Bathyphysa) Studeri* Pl. XXII, fig. 153). The porus is clearly to be seen, not so the hypocystic villi, as the outer wall is whitish opaque, and they do not shine through. On the dorsal wall we very soon see the first indications of appendages, as small buds which gradually change into small cylindrical tubes of some length. The breadth of the stem is $2^1/_2$ mm. These buds develop more and more till about 2 cm. below the pneumatophore, the largest has attained a length of 1 cm., a breadth of $2^1/_2$ mm. With Schneider **98** we consider these appendages young, immature siphons; they are identical with Bedot's pneumatozoids, but the complicated internal structure at their base is wanting entirely. They show already the first indications of Fewkes' so-called ptera on each side. After these 2 cm. the stem shows a first spiral winding to the left and the young siphons which in the beginning were situated very closely together now show a small interval between them. They increase more and more in size; as the ptera are somewhat contracted, the siphon has a curved aspect, its apex being bent convexly. Some siphons do not show this pecularity, they are straight. One side of the pteron-band, is not broader than one third of the whole circumference of the siphon.

A median longitudinal section of the siphon (Pl. XXIV, fig. 170) detached from the stem about 14 cm. distally from the base of the pneumatophore taken near its apex, shows that here there is already an aperture and that we are justified in considering these young buds identical with future full-grown siphons. Near the distal part of A the length of such a siphon is already 2 cm. The stem in part A gets narrower near the base, but preserves throughout its whole length the same appearance. It is transparent, whitish, strongly muscular, many times twisted and contorted. Near the proximal part of B we find that the stem gets broader, more like a ribbon; furtheron it becomes similar again to the first part of the specimen.

The development of the gonodendra could be followed step by step. The very first indication of these appendages is to be seen at the base of the young siphons which are situated on the first turn to the left which the stem performs in its first proximal part underneath the pneumatophore. They are just visible with the naked eye as small white spots. Another is drawn lower down on Pl. XIX; it has already increased in size. The gradual increase of the gonodendra is visible on the base of the intermediate siphons; they were omitted in the drawing Pl. XIX.

Going down A another gonodendron with a microscopic gonostyle is seen near the base of a lower siphon.

Going up B one sees clearly near the base of every siphon how the gonodendron increases in size side by side with its gonostyle. In A tentacles are not yet developed. These show themselves for the first time at the base of the 6th and following siphons as small curved tubular appendages.

The same gradual development as in the gonostyles can also be traced in the tentacles. Whilst in B they are small stumps, we see how in the distal part of C they attain a length of more than one cm. Tentilla were never observed. The shape of the tentacles and their position at the base of the siphon entirely agree with the same in *Pterophysa grandis* which we had the opportunity of examining and which had been identified by FEWKES himself.

B. B has a length of 38 cm. The siphons increase more and more in size, the utmost length being $3^1/_2$ cm. They are all transparent, more or less curved, the ptera on each side have the same development as in A. The tentacles show themselves for the first time as is said above, the gonodendra have attained a dimension of 1 mm. in diameter, one or two of the most distal ones possess a small gonostyle.

C. C attains a length of 30 cm. The stem is somewhat narrower, but does not show any difference in structure from A and B.

The siphons undergo a considerable alteration. They become less transparent, more muscular especially near the aperture; near the base the transparency vanishes entirely, probably through the greater development of the entoderm. On the whole the siphons get a more regular "siphon"-aspect, and only now probably their normal function of assimilating food, which they receive through their mouth-opening, commences. As the transparency of the siphons diminishes so does also the breadth of the ptera. (Compare Pl. XXIV, figg. 167, 168, 169). On Pl. XIX this is not clearly indicated as a space of 15,5 cm. is left out between C and D but still on comparing the siphon "*s* 2" of C with siphon "*s* 1" of B one is struck with the extreme difference in shape. In D, E, F, G and the intermediate parts, which were not drawn, no trace of ptera is left. Therefore we arrive at the following conclusion:

The siphons, which are quite as transparent as their ptera, which latter show a considerable development (at least $^2/_3$ of the whole breadth) and possessing moreover an apical aperture which has been found by making microscopic sections, should be considered as the locomotive appendages of *Pterophysa*. Through expansion and contraction

of the ptera water is driven in and out of the cavity of the siphons and so they act exactly as the nectophores in *Physonecta*.

The tentacles increase in length, so do the gonodendra. The latter are always situated near the base of the siphons.

Between C and D 15,5 cm. of the stem was not sketched; some siphons have become detached the mark of their implantation being left on the stem. The siphons are of the same size as in C, but they alter their aspect more and more, as they gradually lose their ptera, get more muscular at the top and the base and have a more marked aperture surrounded by strong circular muscles.

D. D has a length of 33 cm.; the stem is the same as in the foregoing parts, the siphons have entirely lost their ptera and have become elongate tubular structures. They are implanted on the stem at 4 cm. distance one from the other. In the inferior part of D we see a lower space between two siphons. One of them has probably become detached. The gonodendra are so far developed that one can see the different constituents, viz. clusters of androphores, gynophores and gonopalpons.

The distance left out between D and E measures about 42,5 cm. The stem which up to this distance has always had a certain breadth, gets thinner, more thread-like, absolutely white, no longer transparent. It resembles a thin white string. The siphons are separated by longer distances, the tentacles still increase in length, the gonodendra show a continual increase in size, they grow especially in length (length of a gonodendron with its gonostyle 7 mm., breadth $2^1/_2$ mm.).

E. Of E (length ± $38^1/_2$ cm.) nothing particular is to be mentioned. The gonostyles and gonodendra increase in size, some siphons have fallen off; the fourth siphon of E has lost its gonodendron, the seventh both tentacle and gonodendron. The stem gets thinner, more string-like. The space between E and F has a length of 49,5 cm. Although of considerable length there are only 6 siphons left, the other being lost. The stem becomes fragile, breaks off easily. It is in many places wound spirally. The same is also the case not only in the tentacles but also in the gonostyles. Between two siphons there are bunches of tentacles which were so tightly clustered, that we thought it better not to try to loosen them.

F. F has a length of 38 cm.; it does not differ from D and the intermediate part. The stem broke in two, during preparation. The are six siphons, each bearing a tentacle (some are broken off) and a gonodendron. These are beautifully shaped and probably very near maturity as it seems to us that some gonophores have become detached from the very first gonostyle, as this latter seems to be incomplete. They increase in length, not in breadth; the fourth is especially well-shaped.

Between F and G 31,5 cm. are left open. The unusual thinness and fragility of the stem diminishes. It gets more normally string-like, somewhat transparent, flattened and shows less contorsions. There are three siphons left which show only their tentacle, and as no gonodendron is left, we may assume that the most distal gonodendron (of which only part was drawn on Pl. XIX) situated on F was the oldest and that gradually all the gonophores

becoming detached, the gonopalpons and gonostyle perish. The distance between two siphons in the intermediate part between F and G measures 10 cm.

G. Finally G (length 35 cm.) shows 7 siphons with their tentacles. A few gonostyles are still to be seen, but have been overlooked, whilst drawing Pl. XIX. When we make the addition of the length all the different parts of *Pterophysa grandis* Fewk. Cat. 8 which we have described above we get the considerable amount of:

26 cm. (A) + 38 cm. (B) + 30 cm. (C) + 15,5 cm. + 33 cm. (D) + 42,5 cm. +
+ 38,5 cm. (E) + 49,3 cm. + 38 cm. (F) + 31,5 cm. + 35 cm. (G) = 377,3 cm.

The next in length to *Pterophysa grandis* brought home by the Siboga is *Cat. 94 A.*, which unfortunately does not show the same completeness as Cat. 8. The pneumatophore is missing, and probably also the entire proximal part. The length of the stem is about 2,76 M. There are 16 siphons attached to it, which are situated at great distances one from the other. The first siphon begins 37 cm. below the beginning of the stem. It shows clearly the lateral ptera and has a length of $4^1/_2$ cm. Its tentacle is well-developed and sometimes shows articulation. The following 5 siphons are all still transparent and show nearly the same stage of development as those in the distal part of C in Cat. 8. The most distal siphons of Cat. 94 A. hardly show any sign of ptera. The tentacles are present everywhere, but no gonodendra or any trace of gonostyles could be seen. We suppose therefore that Cat. 94 A. is rather old, and that we found the distal part, the proximal part having probably had a considerable length.

Finally *Cat. 21 A.* (length 53 cm.) seems a portion of Cat. 8 A., resembling part of the stem of the latter between D and E. The stem, however, is very much broader and flattened, in some places even dilated like a flattened vesicle, and twisted. There are 12 siphons, which have a length of 4 and $4^1/_2$ cm. and have accordingly a very muscular appearance. The ptera are very clearly marked. Tentacles are situated on the base of every siphon, and at the same spot there is a remnant of a gonostyle. On the whole it is as if Cat. 21 A. represents the magnified part of Cat. 8 A. between D and E.

58. *Pterophysa (Bathyphysa) Studeri* nov. spec. Pl. XX, fig. 149; Pl. XXII, figg. 153—155, 157—159; Pl. XXIII, fig. 165; Pl. XXIV, fig. 171.

Stat. 126. Lat. 3° 27'.1 N., Long. 125° 18'.7 E. Depth 2053 M. Deep-sea trawl. On cable. *Cat.* 6 A. formald. 4°/₀. One specimen (6 B.—G. parts of various *Pterophysidae*).

Chun **97a** writes that the measures taken of the pneumatophore of *Rhizophysa filiformis* showed unusual dimensions (length 12 mm. breadth 6 mm.). And he continues to say (**97a** p. 79) "Das sind Dimensionen, wie sie unter den bis jetzt bekannt gewordenen Rhizophysiden nur durch "*Bathyphysa Grimaldii* überboten werden, deren Pneumatophoren bei den grössten Exemplaren "nach den Angaben Bedot's 17 mm. misst". In 1904 Bedot writes of pneumatophores in specimens of the same species of the length of 21 and 22 mm. and a breadth of 12 and 8 mm.

In *Pterophysa (Bathyphysa) Studeri* the pneumatophore measures 35 mm. in length (taken along the convex wall) and 20 mm. in breadth, measured proximally to the clusters of hypocystic villi. The breadth-measure, however, cannot be considered absolutely accurate as the wall of the

pneumatophore had burst open and the features of the pneumatophore had become irregular, the hypocystic villi, moreover, showing themselves outside the outer wall. The unique specimen of this new *Pterophysa* is exceedingly interesting as far as the structure of its pneumatophore is concerned. On Pl. XXII fig. 153 we have represented the specimen as it appears to us, but for the absence of the hypocystic villi. These are left out in our drawing as of course in the living specimen these appendages were contained in the interior of the pericystic cavity. Another drawing in black of the pneumatophore (Pl. XX, fig. 149) shows the outer wall entirely split open, after we had cut some small portion of it away, and gives an idea of the beautiful shape of the pneumatocyst, with its silvery wall (secondary ectoderm) and the immense bunch of hypocystic villi of unusual length at its distal part. Both the wall of the pneumatosaccus and of the pneumatophore are characterized by their excessive muscularity, which increases more and more towards the proximal part and reaches its utmost development near the porus. The latter could easily be sounded, the bristle disappearing in the cavity of the pneumatocyst. The ectoderm of the latter is filled with air. We tried to get good sections both of this wall and the outer wall of the pneumatophore. The material, however, seemed to have altered considerably through preservation. But for the chitinous substance and the muscle fibrillae, nothing has remained. No cells, no nuclei were to be found. We do not therefore publish any drawings of these incomplete sections.

The hypocystic villi are unusually large in *Pterophysa (Bathyphysa) Studeri*. When we had cut away distally a small part of the outer wall of the pneumatophore, the remaining hypocystic villi which were hidden behind this wall all came out and we got the sketch given in Pl. XX, fig. 149. We could not distinguish whether there was any regularity in the distribution of these villi on the distal part of the pneumatochone or hypocystic funnel, as Haeckel calls this part of the pneumatosaccus (**88b** p. 320).

Transverse and longitudinal sections through the hypocystic villi are of great interest (Pl. XXII, fig. 155, 157, 158, 159).

After staining some of them we found that in a transverse section the entoderm-layers are numerous, their cells and nuclei are similar to those sketched on Pl. XXII, fig. 156 which was made after material of *Rhizophysa Eysenhardti* Ggbr. (Cat. 16) as the entoderm cells of *Pterophysa (Bathyphysa) Studeri* seem to have altered considerably by preservation (compare transverse section Pl. XXII, figg. 157, 158).

Immediately beneath the numerous entoderm-cells at the top of the villus there lies a nucleus whose structure is very complicated. Chun **97a** tells us that these nuclei usually appear laterally at the distal parts of the cells, sometimes in the middle and rarely at the proximal part. This is the case in *Rhizophysa*, as sections through hypocystic villi in *Rhizophysa Eysenhardti* showed us. In *Pterophysa (Bathyphysa) Studeri*, however, they are always at the proximal club-shaped part in the middle. Moreover we always found only one nucleus in the villi and we wonder whether that implies that there is only one cell, which in that case should have a length of more than 15 mm. On longitudinal sections we found however distinct partitions (Pl. XXII, fig. 159); these are very small and thin, but between two cells no nucleus was to be found except the proximal one. On the whole there is much unknown in the structure of these nuclei

and their surrounding villi and as we intended to keep the material of the Siboga as complete as possible, we could not permit ourselves to cut up the entire pneumatophore of *Pterophysa (Bathyphysa) Studeri*, as we could not be certain owing to the incompleteness of preservation in the proximal part of the pneumatophore, that this would be better in the distal part.

The first figure (Pl. XXII, fig. 157) shows a very complicated structure, the nucleus being branched and divided in all directions, the second (Pl. XXII, fig. 158) shows an increase in size of the whole and less irregularity. On the left side the branches seem to approach the entoderm-cells whilst in the upper part of the drawing to the right, the smooth wall of the nucleus is situated at a greater distance from the entodermal layer. In both drawings the entoderm-cells are irregularly shaped, owing to considerable alteration by the preservative fluids.

The distance between the proximal part of the cell with its huge nucleus and its distal wall is enormous. The distance between the next transverse wall and its proximal one is less, but in this smaller cell we never found a nucleus nor in the distal part of the hypocystic villus. The villus is never branched as is the case in *Rhizophysa Eysenhardti*. This we could not ascertain in the distal part (where the villus is attached to the base of the air-funnel).

The transverse sections of a nucleus and its surrounding entoderm-cells are taken in the direction marked by the lines (Pl. XXII, fig. 155, "fig. 156" "fig. 157") on the longitudinal section.

The drawing of the whole specimen of *Pterophysa (Bathyphysa) Studeri* (Pl. XXII, fig. 153) does not show any young buds of appendages. These are, however, present, but are situated on the other side, as can also be seen from the situation of the first mature siphon. They are situated on the strongly muscular stem in a deep groove, which one can follow all along the stem. The latter has a length of about 70 cm. and appears to us as if it were strongly contracted. It resembles absolutely (and this is of great importance) the stem of *Bathyphysa abyssorum* as STUDER **78** describes it, parts of which were drawn again for us from the original material, thanks to Prof. F. E. SCHULZE's kind assistance. The same flatness which makes it similar to a strong ribbon and the same groove were noticed by us.

The successive stages of development of the siphons are quite different from those in *Pterophysa grandis*. There appears, very much sooner, — only 28 mm. beneath the very first indication of a future siphon — a probably full-grown siphon, having a length of 26 mm. There is a small pedicle at the base of the siphon (Pl. XXII, fig. 154); this is one of the reasons combined with the extreme toughness of stem and pneumatophore, the size of the latter and the shape of the stem, why we incline to consider our specimen very closely related to STUDER's *Bathyphysa*. Of course points of absolute resemblance there are none, but any one who compares the sketches in STUDER's work with our *Pterophysa grandis* (Cat. 8) must acknowledge that Cat. 6 shows a much closer similarity to STUDER's than to FEWKES' specimens. To call our specimen *Bathyphysa* we thought too daring; we therefore used the specific denomination *Studeri* to show the evident relation there exists between this Siboga-specimen and STUDER's material.

The shape of the siphon is elongate, its central cavity shows already a definite development of entoderm-cells and though we could not sound the aperture, there is every reason to believe that the siphon will soon break open and begin its functions. The ptera are opaque, tough structures (see transverse section Pl. XXIII, fig. 165); they seem to be very strong and differ

from the more thinly muscular ptera in *Pterophysa grandis*. An enlarged sketch of the second siphon is given on Pl. XXII, fig. 154. It is situated at a distance of 24 cm. behind the first one and does not show any important difference. The pedicle is as clearly developed as in *Bathyphysa*. There is no sign of any tentacle or indication of a young one. The stem between the first and second siphon attains its greatest breadth. (8 mm.). It shows many turns and at irregular intervals small protuberances also of the same muscular structure (Pl. XXIV, fig. 171). We suppose these to be the implantation of detached siphons, and as we counted 72 of these small swellings, 75 siphons were probably situated on the stem before the specimen was captured. Of these 72, three were present in the same bottle; together with a vast amount of tentacles, and stems and other appendages, impossible to determine, but which to judge by their muscular structure may perhaps belong to *Bathyphysidae*.

The third siphon (distance 12 mm. distally from the second) is mature, as the bristle could be introduced quite easily. Its ptera are the same as in the two others, the entoderm of the central cavity shows peculiar notches which are also slightly visible in the second. Its length is 35 mm., its breadth 9 mm. with the ptera. The stem behind this third siphon shows many alterations in breadth, but no appendages are more "string"-like than the proximal part.

Bathyphysa Studer 78.

59. *Bathyphysa Sibogae* nov. spec. Pl. XX, fig. 148; Pl. XXIII, figg. 160—164; Pl. XXIV, fig. 173.

Stat. 38. Lat. 7° 35'.4 S., Long. 117° 28'.6 E. Depth 521 M. Trawl. Fixation in $CuSO_4$ 10%, formald. 4%. *Cat.* 27 A. One specimen and Cat. 27 B. (detached appendages of 27 A.).

Stat. 227. Lat. 4° 50'.5 S., Long. 127° 59' E. Depth 2081 M. Deep-sea trawl. *Cat.* 5 A., 5 B. (detached appendages of 5 A.). formald. 4%. One specimen.

Cat. 5 A. is one of the most remarkable *Bathyphysidae* found in the Siboga material. It is called *Bathyphysa* as it possesses clearly-marked pedicles at the base of the siphon. Of course the specimen as it is drawn on Pl. XXIII, fig. 160 is not complete and a living *Bathyphysa Sibogae* has, no doubt, a totally different aspect. There are, however, many characteristics which will make it quite easy for later investigators to make the comparison of their material with ours. Cat. 5 A. is the longer specimen of the two, it has a length of about 72 cm. Its pneumatophore (Pl. XXIII, figg. 160, 161) has a length of 9 mm. (measured externally up to the first bud of the siphon) and a breadth of 4 mm. The silvery wall of the pneumatocyst shines through distinctly; we cut away a small part distally and found that behind the hypocystic funnel there are clearly-developed though very small hypocystic villi. This may be a difference from *Bathyphysa abyssorum* Studer but as in the latter the pneumatophore had burst (Pl. XXIV, fig. 166) the villi may have become detached. Pigmentation near the porus is not to be found, it has gone probably through preservation; the porus itself is visible as a clearly-marked aperture (Pl. XXIII, fig. 161). The first buds of young siphons appear even immediately above the place where the hypocystic villi are found interiorly. They very soon become developed, and attain a length of 3—5 mm.; the stem at this point has a breadth of 4 mm. and shows

suddenly a turn to the left as is shown more clearly on Pl. XXIII, fig. 161. The buds of siphons increase in size; they are more or less flattened dorso-ventrally, the ptera are well-developed and do not bend one to the other, which would have altered the aspect of the flattened siphon into a more rounded one.

One of the young siphons (Pl. XXIII, fig. 161 α) we detached and made a sketch of it (Pl. XXIII, fig. 162). It is the most distal one and shows already a different aspect from the others; the ptera are first bent concave, later on convex; the central cavity of the siphon is very clearly developed, and gets narrower and narrower near its apex, until it ends in a sharp point; this also makes the young siphons of *Bathyphysa Sibogae* resemble more or less a foliaceous bract of *Physonecta*. The length of this detached siphon is 6 mm.; at its base there is a very tiny protuberance of which we will speak later. Distally from the last siphon the stem keeps the breadth of 4 mm. along a distance of 10 mm. Then the stem diminishes in breadth and varies from 3—2 mm. along its whole length.

About 2,8 cm. from the above mentioned siphon we find three other siphons, situated at a distance of 5 mm. one from the other. They are all bract-like, without pedicle, and with a central canal ending in an acute point. The ptera have not curled up, therefore the siphons have remained straight. The first siphon has a length of 10 mm., a breadth of 4 mm. of which 3 mm. belong to the transparent ptera; the second and the third have the same structure. Behind this last third siphon the stem for a distance of 27 cm., shows no appendages; of course the median groove or line is quite visible and as this line has not a straight course but shows several turns, we understand that the stem has twisted itself continually. After these 27 cm., the first reproductive appendage is seen as a very small, tiny vesicle, at its side a small hill-like enlargement of the stem. At intervals of 4—6 mm., we find successively the 2^{d}, 3^{d}, 4th, 5th, 6th gonodendra which are already more developed, next a 7th, and every time the enlargement is also there. Near the 8th gonodendron, which this time bears a gonostyle, the hill has changed into a small filament. The 9th gonodendron has been lost, but the filament is yet represented and has attained a length of 2 mm., the 10th gonodendron has increased in size, the 11th has disappeared and a filament of 3 mm. is to be seen.

The next groups of appendages 12, 13, 14 consist of hill-like enlargements, but no gonodendra nor filaments; the 15th shows a gonodendron of a length of 3 mm. with a distinct gonostyle. Of the groups of appendages 16, 17, 18, 19, 20 (all of which are clearly to be seen on the stem) only these peculiar filaments are left, in group 16 even attaining a length of 18 mm. In these five last groups the length of the internodes varies from 5—9 mm.

At last we found a group (21) where a siphon was left and we then found that these filaments, which we could follow up to their very primary development as hill-like enlargement near the smallest gonodendron, were stalks, pedicles of the siphons. In this 21st group we also see the gonostyle situated absolutely close to the base of the siphon stalk. The gonodendron has disappeared. The pedicle of the siphon has a length of 18 mm., and is thread-like, it bears a long siphon (30 mm.) of 3 mm. breadth in which the ptera are yet visible as very narrow longitudinal stripes. The central cavity has very strongly marked circular muscles.

Of considerable interest is the occurrence of a tentacle with tentilla at the base of the

siphon (Pl. XXIII, fig. 163). The tentacle has a length of 13 mm., and is articulate, every segment showing a convex and a flattened side, all being connected together by a band, a strongly muscular, at the same time, absolutely transparent cord. Between two segments, a tentillum is attached on the internode, of which a strongly magnified view after staining with alum carmine and orange G is seen on Pl. XXIII, fig. 164. It is the largest and oldest tentillum which was found on the specimen and the same which is figured on Pl. XXIII, fig. 163. The drawing of this tentillum shows the development of an elongate terminal filament and two side ones; owing to the small size of the latter, we suppose that even this tentillum has not reached its definite size; the presence of only a small quantity of cnidocysts (yellow-coloured spherical) makes it probable we have reason to believe so. In the sketch the entoderm is black. We suppose that the lighter coloured grey ectoderm has been lost at the apex, probably through explosion of many cnidocysts.

Up to this time tentilla of *Bathyphysidae* have not yet been described. A general resemblance to those of *Rhizophysa filiformis* Forsk. is not deniable, whilst there is also much similarity in the mode of attachment of the tentilla and in the shape of the tentacle to *Erenna Bedoti* (see p. 68) and Bedot's *Erenna Richardi*.

Another mature siphon (47 mm. distance from the first number 23) shows absolutely the same structure as the siphon of the 21st group. The pedicle has a length of 2 cm., the tentacle and its tentilla (the latter shows only younger ones than those of the 21st siphon) are of the same structure. Between these two siphons another notch on the stem shows that here again a siphon (22), and a gonostyle have become detached. So the second mature siphon probably belongs to the 23^{d} group of appendages.

The remaining part of the stem, 18 cm. distant from the last siphon mentioned above, shows no more appendages. It is very irregular in shape, sometimes narrow, sometimes broad and bears here and there small branches, the stalks of detached siphons.

Cat. 27 (Pl. XX, fig. 148, Pl. XXIV, fig. 173) we also called *Bathyphysa Sibogae* as in the oldest siphons the stalk, although small, could be distinguished together with a tentacle with immature tentilla at the base of these siphons.

Cat. 27 has a length of only 10 cm. and all its appendages are accordingly of small size.

The pneumatophore has a length of 6 mm., it is pear-shaped and attains its greatest breadth at its base (2,5 mm.). It is clearly marked off from the stem by a constriction. The wall of the pneumatocyst shines through, hypocystic villi could not be discovered quite distinctly. The pneumatophore has no pigmentation at its top. Immediately beneath the pneumatophore the siphons begin to develop; they have the same shape as the young ones in Cat. 5 A. but of course much smaller. Magnifying with a lens the ptera are already visible. Again an incision is seen on the stem, occasioned by a sudden turn of the stem; the appendages appear on the right side, very closely packed together. These appendages are all situated at the same side along a distance of 20 mm. (6 mm. beneath the pneumatophore). The stem along this part has a breadth of 2,5 mm. The siphons are without pedicle and the oldest attains already a length of 6 mm. and a stage of development more or less equal to the three young siphons which in 5 A. were situated 28 mm. behind the last young bud of a siphon.

From this point to 13 mm. farther the stem and appendages show an increase in size and a development at the base of the more advanced ones of a microscopically small spherical bud, the future gonodendron.

From this latter point to 20 mm. farther the stem shows continual turns but keeps its original shape and breadth of 2,5 mm. The siphons attain a length of 8 mm., are still without stalk, but get more the characteristic shape of true siphons. The ptera diminish in size, the central canal of the siphon deepens in colour owing to the increase of entodermic layers. In general we find here the same slow alteration of the siphons having a swimming function into those with a normal nutritive function, that we found in Cat. 8 *Pterophysa grandis* Fewk.

Finally the most distal part of the stem is very much contracted and shows a series of the most unexpected turns and contorsions the result being the scattered position of siphons and gonodendra.

When carefully examining the last three siphons and detaching them from the stem, we found that at the base a small stalk is developed. The more proximal siphon shows a stalk of very small size indeed, but the most distal third one has a peduncle attaining the length of 2,5 mm.

At the same time we had to disentangle some thread-like structures to detach the siphons. They bore great similarity to tentacles. In the bottle we found two detached siphons which in size and shape do not differ at all from the most distal siphons of Cat. 27. And we found that at the base of these siphons a tentacle with tentilla is developed (Pl. XXIV, fig. 173) which although the tentilla are small, bear a certain resemblance to those of Cat. 5 A.

We do not doubt therefore that Cat. 27 is simply a young specimen of Cat. 5 A. and that both belong to the new species *Bathyphysa Sibogae.*

Detached appendages, parts of stem, tentacles of *Bathyphysidae.*

Stat. 17. Lat. 7° 28'.5 S., Long. 115° 28' E. Depth 1060 M. Deep-sea trawl. *Cat.* 9, 106. formald. 4°/₀.
Stat. 88. Lat. 0° 34'.6 N., Long. 119° 8'.5 E. Depth 1301 M. Deep-sea trawl. *Cat.* 16. formald. 4°/₀.
Stat. 124. Lat. 2° 27' N., Long. 125° 35' E. Depth 1327 M. *Cat.* 13. On cable. formald. 4°/₀.
Stat. 126. Lat. 3° 27'.1 N., Long. 125° 18'.7 E. Depth 2053 M. Deep-sea trawl. On cable. *Cat.* 6 B., 6 C., 6 D., 6 E., 6 F., 6 G. formald. 4°/₀.
Stat. 161. Lat. 1° 10'.5 S., Long. 130° 9' E. On cable. Depth 1798 M. *Cat.* 2 A., 2 B. formald. 4°/₀.
Stat. 207. Lat. 5° 7'.5 S., Long. 122° 39' E. Buton-strait. *Cat.* 116 A. formald. 4°/₀.
Stat. 223. Lat. 5° 44'.7 S., Long. 126° 27'.3 E. Depth 4391 M. On cable. *Cat.* 12. formald. 4°/₀.

The appendages caught in six different stations belong probably to *Bathyphysidae*, owing to their excessive muscular development. It is, however, impossible to determine them specifically. Still it seems interesting to indicate the different depths they come from (of course wherever "on cable" was found on the label they may have come from any depth) and to draw attention to the fact that the largest amount of detached appendages was found in the same station in which also *Pterophysa (Bathyphysa) Studeri* (Cat. 6) was caught.

Fam. Physalidae Brandt 35.

Physalia Lam.

60. *Physalia utriculus* La Martinière. Pl. XXIV, figg. 174, 175.

= *Physalia utriculus* La Martinière 1787.
= *Physalia utriculus* Gmelin. 1787.
= *Physalia utriculus* Eschsch. 29.
= *Physalia utriculus* Huxl. 59.
= *Physalia utriculus* Chun 87.
= *Physalia utriculus* Chun 97a.

Stat. 19. Lat. 8°44'.5 S., Long. 116°2'.5 E. Bay of Labuan Tring, West-coast of Lombok, *Cat.* 3. One specimen. alc. 90°/₀. killed by gradual addition of alcohol.
Stat. 172. Gisser; anchorage between this island and Ceram-Laut. *Cat.* 4. alc. 90°/₀. 20 specimens.
Stat. 181. or 232. Ambon. *Cat.* 125. alc. 90°/₀. One specimen.

The 22 specimens of *Physalia utriculus* are tolerably well-preserved in alcohol and of nearly the same size, with exception of Cat. 125 which is larger.

The literature of *Physalia* is enormously extensive and very confused. As we were unable to examine the very oldest papers written on this subject, we confided in the authority of well-known authors on *Siphonophores*, among whom we mention especially Eschscholtz **29**, Huxley **59** and Chun **87** and **97**a.

Chun makes a fundamental division of all known *Physalidae*. He distinguishes *Physalidae* of the Atlantic Ocean and *Physalidae* of the Indian and Pacific Ocean. The most important difference between the two, is that in the latter only one largest tentacle is developed, around which the other appendages become developed, and that in the distal region no such "Haupttentakel" ever develops (Chun **97**a p. 86). The atlantic *Physalidae* are characterized by the presence of many such large tentacles on every part of the zone of proliferation.

Indo-Pacific *Physalidae* he calls *Physalia utriculus* and this name we retained for the specimens brought home by the "Siboga".

Cat. 3 is a specimen in which only few appendages are left. As the float is well-developed and of large size (length 3,5 cm.) we may suppose that many of its appendages have become detached.

The shape of the float varies extremely in all our specimens, owing to the various stages of contraction by the preservative fluids. In Cat. 3 it is well-shaped, elongate, drawn out proximally whilst its septa in the crest are clearly marked. Between the proximal point and the groups of appendages a considerable space is left open. The appendages consist of one large tentacle attaining considerable length and around it some groups of siphons. Gonodendra there are none. A few buds of future appendages are to be seen on the most distal part of the specimen, but no sign of tentacles was to be found. On the whole Cat. 3 was very unsatisfactory for examination. Better are the 20 specimens of Cat. 4. These are all of nearly the same size (float 4, $4^1/_2$, 5 cm.) and as they belong to the same species, they belong probably to one of these great masses of *Physalidae*, which float quietly on the surface of the sea.

As is said above the shape of the pneumatophore varies exceedingly. The appendages are numerous. Next to the main tentacle (length of the longest 20 cm.) there are several smaller ones. The main tentacle was always wanting in the distal part of the specimen. Reproductive appendages were present in all stages of development.

Of the exact position of all the other appendages nothing could be said, as contraction of the float makes it difficult to consider the position the appendages have taken, to be the definite normal one. It seems to us that the position of appendages and their various ways of arrangement are not at all to be traced in fully-developed specimens which are preserved in spirit. The best way to know more about it seems to us to follow the development of the appendages from the earliest larval stages up to the mature ones.

Huxley **59** found two larval stages, Haeckel **88b** describes also some of them and so does Chun **97a**. The latter informs us that he will publish a monograph of *Physalidae* and we are looking forward to an exact description of the development of the appendages in *Physalia*, which will certainly fill a great void.

Some authors suppose there is no definite arrangement of appendages in *Physalidae*, but it seems to us they cannot make an exception in the general structure of *Siphonophora*, which always shows some kind of definite arrangement.

We abstain from giving a detailed enumeration of the Siboga material as we should have to describe one specimen after the other, and this would create too much confusion: preserved *Physalia* never being normal.

Among the 20 specimens of *Physalia utriculus* of Cat. 20 there were some which showed many beautiful gonodendra, attaining considerable size. We thought it interesting to detach one of them and tried to separate the different groups, so as to get a definite idea of its structure.

Chun **97a** gives a preliminary description of the structure of gonodendra in *Rhizophysaliae* of which we propose to give a summary as it seems to us to be useful when comparing our material with his observations.

In *Rhizophysa* (Chun **97a**) a mature gonostyle shows one main branch which gives off many side-branches. Each of these side-branches consists of one sexual palpon ("Genitaltaster") one medusoid gonocalyx and 8—9 gonophores. A gonodendron of *Physalia* differs from the same in *Rhizophysa* through the presence of polyp-like appendages, which formerly Chun thought represented the proximal part of the medusa as they resembled exactly the basal part of the medusiform gonocalyx and these might have become detached.

However they have nothing to do with these structures as they also appeared in young stages of gonodendra. Chun calls them "Gallertpolypoide". They are situated at the proximal part of the furthest side-branches. They consist of tubes of which the proximal third part is bent and lies against ("angeschmiegt") the main stem and is attached to the latter by a muscular lamella. A distal opening was never to be found according to Chun.

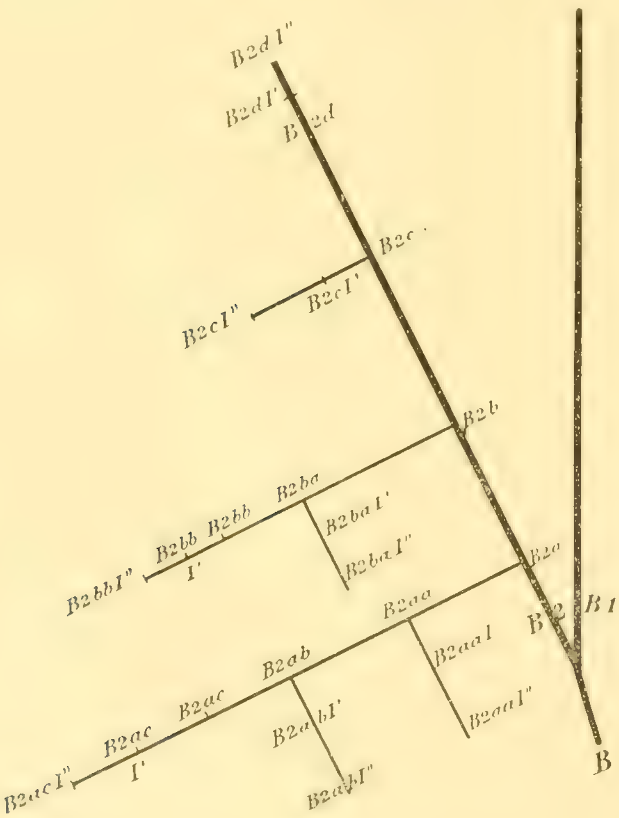
Chun describes further on (p. 69) the development of a gonodendron in *Rhizophysa*, which we will not repeat so far as the description of the earlier stages is concerned. As soon as the "maulbeerförmige Gestalt" has been reached each of the semispherical buds constitutes one side-branch of the gonostyle. All these side-branches keep the same degree of development; not

one develops sooner than the other. The medusiform gonocalyx differentiates itself first and shows the limit of two divisions of the side-branch, the proximal consisting of the stalk with the gonophores, the distal of the gonopalpon. In *Physalia* three "Polypoide" are developed at the same time with the medusiform gonocalyx; the proximal one develops into the gelatinous polypoid (Gallertpolypoid) the two distal ones take the medusiform gonocalyx between them and develop into gonopalpons. The gonophores develop only later.

Comparing Chun's statements with our material we found the following differences.

A well-developed gonodendron was taken from the stem of a full-grown *Physalia* (Pl. XXIV, fig. 175). It showed six side branches, of which four were situated on the right side, two on the left. The first two situated closest to the basal part of the common gonostyle are situated on the right and left sides opposite to each other. They were called A (right lateral branch) and B (left lateral branch).

The other divisions of the main-branch are C, D, E to the right and F to the left. The main-branch ends into the two terminal side-branches E and F. Moreover we find on the right side a palpon-like structure of which we will speak later (see p. 121) and on the left a gelatinous polypoid; gonophores were also found scattered on the main branch.



52.

Fig. 52. *Physalia utriculus* Lamartinière. A diagrammatic sketch of the subdivision of a side-branch in a fully-developed gonodendron.

For a further separation we chose the side-branch *B*. (textfigure 52).

B bifurcates at once into two side-branches *B 1* on the right, *B 2* on the left. Again it seems that the further division of *B 2* is the most normal one.

It gives off three tertiary side-branches all situated on the left side. So here there is no question of bifurcation. These branches (*B 2 a*, *B 2 b*, *B 2 c*) all subdivide again as follows: *B 2 a* divides into *B 2 aa*, *B 2 ab* and *B 2 ac*.

And it is only now that we can distinguish the different constituents of the gonodendron; *B 2 aa* namely shows a proximal part (*B 2 aa I'*) consisting of one gonopalpon, 5 gonophores and the very same gelatinous polypoid. Chun speaks of its basal part being imbedded in the gelatinous and muscular substance of this side-branch of the gonostyle. The distal part of *B 2 aa* is *B 2 aa I''* and consists of one gonopalpon eight gonophores and a long stalked, medusiform gonocalyx.

B 2 ab shows absolutely the same amount of appendages that is to say: *B 2 ab I'* shows one Gallertpolypoide, a gonopalpon, 8 gonophores, and *B 2 ab I''* consists of one palpon, one medusiform gonocalyx, 8 gonophores.

B 2 ac constitutes the terminal group of appendages and may also be divided into two different parts, the proximal *B 2 ac I'* (one gelatinous polypoid, 8 gonophores, one gonopalpon) the distal *B 2 ac I''* (one gonopalpon, one medusiform gonocalyx, 8 gonophores).

Situated proximally to *B 2 a* is *B 2 b*, which this time shows only one left side-branch and a terminal group; the side-branch (*B 2 ba*) shows again a division into a proximal group *B 2 ba I'* (one gelatinous polypoid, one gonopalpon, 4 gonophores, the gonopalpon containing black granulations) and a distal group *B 2 ba I''* (one gonopalpon, one medusiform gonocalyx, 4 gonophores). Next to *B 2 b* we find the third left lateral group *B 2 c* which consists of one group only, *B 2 c I'* distally (one gelatinous polypoid, one gonopalpon with granulation, 6 gonophores) and *B 2 c I''* proximally (one gonopalpon, one medusiform gonocalyx, 5 gonophores). Finally we find as a terminal group the two constituents *B 2 d*, which consists of one gelatinous polypoid, one palpon, 2 gonophores and *B 2 e* which consists of one medusiform gonocalyx, 5 gonophores and a gonopalpon.

This division of the first left side-branch shows assuredly the utmost regularity. We have continued to analyse all the other side-branches and have found the most astounding variety.

It would take too long to give a lengthy description of all the side-branches (*A*, *B 1*, *C*, *D*, *E*, *F*). The arrangement of the side-branches is as it seems to us nearly always indefinite and irregular, as of all these only *B 2* showed some regularity. But as it happens, in all the end-branches we find the two divisions: one palpon, one gelatinous polypoid, gonophores and one medusiform gonocalyx, one palpon and again gonophores. In all 46 of these double-groups we find the same constituents. Only in one case (the fourth lateral division of the side-branch *A*) we find besides the double-groups one more in addition so that such a threefold group consists of proximally: 1) one gelatinous polypoid, one palpon, 5 gonophores; 2) one medusiform gonocalyx, one palpon, 5 gonophores; 3) one medusiform gonocalyx, one palpon and 5 gonophores. We cannot say whether this division into three is quite an abnormal one, but we rather incline to think this is the case, as out of 46 groups only one was threefold.

We noticed also in many cases that in palpons (never in gelatinous polypoids) there occurred internally black granulations. In all the 46 groups we found no distinct mouth-opening. The remarkable polypoid structure which occurs between the two main side-branches *A* and *C* (see Pl. XXIV, fig. 175) shows not only distinctly the same black granulations but also a very clearly visible mouth, the aperture to be seen with the naked eye. We cannot call this structure a palpon and further as its walls are very muscular we incline to regard it as a siphon. In that case the main branch of the gonodendron could be considered as part of the stem of the siphosome and in that case the side-branches *A*, *B*, *C*, *D*, *E*, *F* would be considered as the real gonodendra.

One bunch of generative organs then consists of many gonodendra.

In that case the only gelatinous polypoid belongs also to the main stem of *Physalia*. How far the palpons, siphon and gelatinous polypoid are related, we cannot say.

We always found that in the group in which a medusiform gonocalyx occurs, the gelatinous polypoid is wanting and vice versa. But it is not therefore at all certain that the gelatinous polypoid constitutes a modified medusoid gonocalyx, and has assumed a function which is as yet unknown.

The division of the constituents of one group does not mean any difference with Chun's observations. But Chun seems not to have noticed the very distinct division into two, as he speaks of the intermixture of loose palpons and gelatinous polypoids on the different side-branches. He does not write about the appearance of the large siphon and of the gelatinous polypoid on the main-stem.

Two very interesting papers on the structure of gonodendra in *Physalia* have just appeared. The first was published in **1906** by O. Steche; it seems that the small spherical generative organs of the gonodendron, which up to this time have been considered as androphores only, are in other cases also gynophores. A complete gonodendron is either male or female. The origin and the function of the medusiform gonocalyx remains a mystery.

The last publication on *Siphonophores* is that of Richter (**1907**) who independently of Steche published an extensive work on the same subject which differs from the latter only in minor details.

II. Legio Tracheophysae Ch. 88.

Subordo Chondrophorae Cham. 21.

Fam. Porpitidae Brandt 35.

Porpita Lamarck 1801.

61. *Porpita umbella* O. F. Müller.

= *Holothuria denudata* Forskål 1775.
= *Medusa umbella* O. F. Müller 1776.
= *Porpita gigantea* Per. et Les. 1807.
= *Porpita glandifera* Lam. 16.
= *Porpita atlantica* Less. 26.
= *Porpita mediterranea* Eschsch. 29.
= *Porpita umbella* Eschsch. 29.
= *Porpita Linnaeana* Less. 43.
= *Porpita mediterranea* Köll. 53.
= *Porpita Linnaeana* A. Agass. 83.

Stat. 19. Lat. 8° 44'.5 S., Long. 116° 3'.5 E. Bay of Labuan Tring. West-coast of Lombok. *Cat.* 202. One specimen. alc. 90°/₀.
Stat. 38. Lat. 7° 35'.4 S., Long. 117° 28'.6 E. and
Stat. 39. Lat. 7° 31'.2 S., Long. 117° 42' E. *Cat.* 205, 206, 207, 208, 209, 211. formald. 4°/₀. 6 specimens.
Stat. 45. Lat. 7° 24' S., Long. 118° 15'.2 E. and
Stat. 45ᵃ. Lat. 7° 30'.5 S., Long. 118° 15'.5 E. *Cat.* 72, 74, 104. formald. 4°/₀. 3 specimens.
Stat. 157. Lat. 0° 32'.9 S., Long. 130° 14'.6 E. 4 1/2 cables N.N.W. of the North-point of Great Fam-island, Jef-Fam-Besar. *Cat.* 198. formald. 4°/₀. One specimen.
Stat. 194. Lat. 1° 53'.5 S., Long. 126° 29' E. *Cat.* 212, 213. formald. 4°/₀. 2 specimens.
Stat. 214. Lat. 6° 30' S., Long. 121° 55' E. *Cat.* 188 B., 189, 190. formald. 4°/₀. 3 specimens.
Stat. 230. Lat. 3° 58' S., Long. 128° 20' E. *Cat.* 193, 195, 196, 197. formald. 4°/₀. 4 specimens.

Chun gives **97a** an extensive description of the nomenclature used by all the preceding

authors for *Porpitidae*, and he comes to the conclusion that a great many Atlantic and Mediterranean forms should be reckoned as only one species, *Porpita umbella*. The different synonyms show what a large number of species have been founded. As well as for the Indian and for the Pacific species, the nomenclature is exceedingly extensive.

As regards *Porpitidae* the Siboga material is entirely insufficient for real anatomically or even morphologically thorough description. In some specimens the naked disk only has remained, in others nearly all the appendages are lost and the colours of course are all gone. Comparing, however, these poor remains with AGASSIZ' complete description **83** we found no difference whatever between them and *Porpita Linnaeana*, and as CHUN also regards this species as *Porpita umbella*, we use also here the same specific denomination for the twenty incomplete specimens of the Siboga expedition.

Diameter of the disk varies from 5 mm. to 23 mm. CHUN finds the measurements 4—20 mm.

Fam. VELELLIDAE Brandt 35.

Velella Lamarck 1801.

62. *Velella pacifica* Eschsch. 29.

Stat. 223. Lat. 5° 44'.7 S., Long. 126° 27'.3 E. *Cat.* 123. alc. 90°/₀. One specimen.
Stat. 226. Lat. 5° 26'.7 S., Long. 129° 36'.5 E. *Cat.* 112. alc. 90°/₀. 4 specimens.

The five specimens from the Siboga expedition are small and young and their appendages are very insufficiently preserved. A characteristic of *Velella pacifica* given by ESCHSCHOLTZ is the triangular shape of the crest; this is also the case in all our specimens. The crest is moreover in all specimens a "Northwestern" one; that is to say, if we take the specimen before us, with its longer side in front the crest goes from South-east to North-west. This seems to be rare in *Velellidae*, as CHUN amongst his material found 71 South-western against 6 North-western, and amongst AGASSIZ' material there was not one North-western.

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CONTENTS.

CHAPTER II.

ERRATA.

Page 10. In fig. 10 "*l*" to be added between the letters *j'* and *a''*.

Page 14. Line 13. A, A', B, B' etc., read: A, B, B' etc.

Page 14. Line 18. and a', a''' and ridge f' for facet B, read: and a', a''', b', and ridge f' for facet B.

Page 14. Line 22. same shape as A', read: same shape as A.

Page 16. Line 22. (see p.), read: (see p. 55).

Page 24. Line 34. MAYER 98, A. AG. and MAYER 1900, read: MAYER 1900, A. AG. and MAYER 98.

Page 33. Line 26. a very small ridge *g*, read: a very small ridge *q*.

Page 41. Line 32. (see ventral fig. 51, *hydr.*), read: (see ventral fig. 50, *hydr.*).

Page 70. Line 10. the shape of the uniform tentilla, read: the shape of the reniform tentilla.

Page 90. Line 15. FEWKES' description of 1881, read: FEWKES' description of 1884.

PLATES

(drawn by the authors; Figg. 85, 86, 137, 138 by Mr. J. PRIJS and
Figg. 107, 146, 152 by Mr. K. C. HANAU).

PLATE I.

Fig. 1. *Doramasia pictoides* nov. spec. (Cat. 42 $B.A_1$). 4 ×. Lateral view. *brgon* = bud, probably future bract and gonophore.

Fig. 2. *Ceratocymba asymmetrica* nov. spec. (Cat. 91 Q.). 11 ×. Ventral view of a bract; for the explanation of the letters see text p. 11. *phyl.* = phyllocyst.

Fig. 3. *Ceratocymba asymmetrica* nov. spec. (Cat. 91 Q.). 10 ×. Dorsal view of the same; *phyl.* = phyllocyst.

Fig. 4. *Ceratocymba asymmetrica* nov. spec. (Cat. 128 F.). 8 ×. Left lateral view of a bract; *phyl.* = phyllocyst.

Fig. 5. *Ceratocymba asymmetrica* nov. spec. (Cat. 77 C.). $22^1/_2$ ×. Left lateral view of a gonocalyx.

Fig. 6. *Clausophyes galeata* nov. gen. nov. spec. (Cat. 157 B.). 4 ×. Left lateral view of the (superior or inferior?) nectophore.

Fig. 7. Ventral view of the same. 5 ×. The dotted line indicates the original shape of the left antero-lateral tooth.

Fig. 8. Ventral view of the (?) somatocyst of the same. 28 >.

Fig. 9. *Chuniphyes multidentata* nov. gen. nov. spec. Right latero-ventral view of the superior nectophore (Cat. 44 F.J.). 4 ×. For the explanation of the letters see text p. 13.

Fig. 10. Dorsal view of the superior nectophore of the same. 2 .

Fig. 11. Ventral view of the superior nectophore of the same. 4 ×.

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PLATE II.

Fig. 12. *Chuniphyes multidentata* nov. gen. nov. spec. (Cat. 44 F.J.). Enlarged view of the (?) somatocyst and stem. 28 ×. *a. c.* anterior, *r. c.* right lateral, *l. c.* left lateral branch of the (?) somatocyst. *st.* stem.

Fig. 13. *Chuniphyes multidentata* nov. gen. nov. spec. Dorsal view of the inferior nectophore. 2 ×.

Fig. 14. Right lateral view of the same. 2 .

Fig. 15. Right latero-ventral view of the same. 2 ×.

Fig. 16. ? *Lilyopsis diphyes* Vogt. (Cat. 156). 2 ×. Nectophore.

Fig. 17. *Abyla pentagona* Q. et G. (Cat. 58 D.I.). $18^{1}/_{2}$ ×. Dorsal view of a superior nectophore.

Fig. 18. Ventral view of the same. 13 ×.

Fig. 19. Right lateral, somewhat ventral view of the same. 13 ×.

Fig. 20. *Abyla pentagona* Q. et G. (Cat. 122 E.). Apical view of an inferior nectophore. 11 ×.

Fig. 21. *Aglaisma cuboides* Lkt. (Cat. 119 D.). Complete. 20 ×.

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PLATE III.

Fig. 22. *Abylopsis quincunx* Ch. (Cat. 122 E.I.). 15 ×. Left lateral view.
Fig. 23. Right lateral view of the same. 15 .
Fig. 24. *Abylopsis quincunx* Ch. (Cat. 126 D.I.). 14 ×. Dorsal view of a superior nectophore.
Fig. 25. Ventral view of the same. 14 ×.
Fig. 26. Right lateral view of the same. 14 ×.
Fig. 27. *Abylopsis quincunx* Ch. (Cat. 122 E.). 11 ×. Basal view of an inferior nectophore.
Fig. 28. *Aglaismoides Eschscholtzii* Huxl. (Cat. 97 D.). 15 ×. Dorsal view of the bract.
Fig. 29. Ventral view of the same. 10 >.
Fig. 30. Left lateral view of the same. 10 ×.
Fig. 31. Dorsal, somewhat basal view of the same. 10 ×.

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PLATE IV.

Fig. 32. *Abyla bassensis* Huxl. (Cat. 25 V.C.I.). 10 ×. Complete.
Fig. 33. *Sphenoides australis* Huxl. (Cat. 122 H.). $12^1/_2$ ×. Bract.
Fig. 34. *Abyla trigona* Q. et G. (Cat. 77 B.). 18 ×. Dorsal view of a superior nectophore.
Fig. 35. Ventral view of the same. 15 ×.
Fig. 36. *Abyla trigona* Q. et G. (Cat. 138 D.). 13,4 ×. Right lateral view of a superior nectophore.
Fig. 37*a*. *Amphiroa alata* Les. (Cat. 168 C.). 8 ×. Left lateral view of the bract.
Fig. 37*b*. Ventral view of the same. 8 ×.
Fig. 38. Lateral view of a ♂ gonocalyx of the same. 13 ×.

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PLATE V.

Fig. 39. *Abyla Haeckeli* nov. spec. (Cat. 91 P.). Dorsal view of the superior nectophore. 12,4 ×.
Fig. 40. Ventral view of the same. 12,4 ×.
Fig. 41. Right lateral view of the same, showing also the apical facets. 12,4 ×.
Fig. 42. *Abyla Leuckarti* Huxl. (Cat. 80 E.). Dorsal view of the superior nectophore. 7 ×.
Fig. 43. Ventral view of the same. 7 ×.
Fig. 44. Left lateral view of the same. 7 ×.
s. = siphon, *som.* = somatocyst, *n.sac.* = nectosac.
Fig. 45. Apical view of the same. 7 ×.
Fig. 46. Basal view of the same. 7 ×.

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PLATE VI.

Fig. 47. *Diphyabyla Hubrechti* nov. gen. nov. spec. (Cat. 118). $6^1/_2$ ×. Right lateral view of the superior nectophore.
som. = somatocyst, *hydr.* = hydroecial cavity, *n. sac.* = nectosac, *br.* = bract, *α.* artificial ridge.

Fig. 48. *Diphyes contorta* nov. spec. (Cat. 122 C.). 20 ×. Dorsal view of a superior nectophore.
For the explanation of the letters see text p. 41.

Fig. 49. *Diphyes contorta* nov. spec. (Cat. 164 H.). 15 ×. Left lateral view of a superior nectophore.
som. = somatocyst, *n. sac.* = nectosac.

Fig. 50. Nearly ventral view of the same. 15 ×.
n. sac. = nectosac, *hydr.* = hydroecial cavity.

Fig. 51. *Diphyes dispar* Cham. et Eys. (Cat. 127). Left lateral view of the superior nectophore. 4 ×.

Fig. 52. One of the groups of appendages of the same, enlarged. 20 ×.

PLATE VII.

Fig. 53. *Diphyes Nierstraszi* nov. spec. (Cat. 166 C.G.). 7 ×. Right lateral view of the superior nectophore.
Fig. 54. *Diphyes indica* nov. spec. (Cat. 45 A.I.). 10 ×. Left lateral view of the superior nectophore.
Fig. 55. *Diphyes (Diphyopsis) malayana* nov. spec. (Cat. 100 A. 2). 15 ×. Right lateral view of the superior nectophore.
Fig. 56. Basal part of the same enlarged 30 ×.
Fig. 57. *Diphyes (Diphyopsis) Gegenbauri* nov. spec. (Cat. 42 A. (2)). 15 ×. Right lateral view of the superior nectophore.
Fig. 59. *Diphyes (Diphyopsis) subtiloides* nov. spec. (Cat. 97 B.I.). 10 ×. Right lateral view of the superior nectophore.
Fig. 60. *Diphyes (Diphyopsis) subtiloides* nov. spec. (Cat. 80 J.). 12 ×. Ventral view of the superior nectophore.
Fig. 61. Left lateral, nearly ventral view of the same. 12 ×.
Fig. 62. *Eudoxia campanula* Lkt. Complete. 21 ×.

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PLATE VIII.

Fig. 58. *Diphyes (Diphyopsis) Gegenbauri* nov. spec. (Cat. 42 A. (2). 15 ×. Left lateral view of the superior nectophore.

Fig. 63. *Diphyopsis campanulifera* Q. et G. (Cat. 80 A.I.). 7,7 ×. Complete. Left lateral view.

Fig. 64. *Ersaea Lessoni* Huxl. (Cat. 166 C.A.I.). 10 ×. Complete. Left lateral view.

Fig. 65. *Diphyopsis diphyoides* nov. spec. (Cat. 80 H.I.). 11,5 ×. Left lateral view of the superior nectophore.

Fig. 66. Dorso-basal view of the same. *a* = basal ridge. 11,5 ×.

Fig. 67. *Diphyopsis Weberi* nov. spec. (Cat. 55 B.I.). $8^1/_3$ ×. Left lateral view of the superior nectophore.

Fig. 68. Dorso-basal view of the same. 10 ×.

Fig. 69. *Diphyopsis anomala* nov. spec. (Cat. 58 G.). 20 ×. Left lateral view of the superior nectophore.

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PLATE IX.

Fig. 70. *Diphyopsis anomala* nov. spec. (Cat. 58 G.). 20 ×. Right lateral view of the superior nectophore.
Fig. 71. Detached inferior nectophore of *Diphyopsinae*. (Cat. 77 D.). 26 ×. Right lateral view.
Fig. 72. Dorsal view of the same. 24 ×.
Fig. 73. Ventral view of the same. 24 ×.
Fig. 74. *Galeolaria quadrivalvis* Les. (Cat. 164 L.(2)). 4 ×. Left lateral view of the superior nectophore.
Fig. 75. *Galeolaria biloba* M. Sars. (Cat. 119 E.(1)). 4,5 ×. Right lateral view of the superior nectophore.
Fig. 76. *Galeolaria monoica* Ch. (Cat. 97 E.(1)). 5,6 ×. Right lateral view of the superior nectophore.
Fig. 77. Basal view of the same. 20 ×.
Fig. 78. *Galeolaria Chuni* nov. spec. (Cat. 97 E.(3)). 15 ×. Right lateral view of the superior nectophore.
Fig. 79. *Galeolaria Chuni* nov. spec. (Cat. 97 E.(1)). 10 ×. Basal view of the same.
Fig. 80. *Hippopodius luteus* Q. et G. (Cat. 105 B.). 4 ×. One of the nectophores.

PLATE X.

Fig. 81. *Forskalia contorta* M. Edw. (Cat. 114). 9 ×. Complete.
Fig. 82. *Forskalia Edwardsi* Köll. (Cat. 183). 9,25 ×. Complete.
Fig. 83. *Forskalia Edwardsi* Köll. (Cat. 215 J.). 60 ×.

PLATE XI.

Fig. 84. *Forskalia contorta* M. Edw. (Cat. 114). 36 ×. Detached tentacle and tentilla of Fig. 81.

Fig. 85. *Erenna Bedoti* nov. spec. (Cat. 7). 4 ×. Detached nectosome.
pn = pneumatophore, *bn* = buds of nectophores, *bna* = immature nectophore, enlarged view in fig. 87, *rn* = remains of detached mature nectophores, *ns* = nectosome, *a* = point where the siphosome (Fig. 86) has been attached to the nectosome.

Fig. 86. The siphosome of the same. 4 ×.
a' = point where the nectosome (Fig. 85) has been attached to the siphosome, *s, s* = siphons (showing only their basal part, the basigaster and proboscis having been lost), *t, t* = tentacles, *ti, ti* = tentilla. For α, 1, 2, and 3 see text p. 67.

Fig. 87. Young nectophore (*bna* of Fig. 85) enlarged. 25 ×.

Fig. 88. Tentacle and young tentilla of the same. 8 ×.
t, t = tentacle, *ti, ti* = tentilla.

Fig. 89. Enlarged view of a tentillum, somewhat older than those on fig. 88 of the same. 15 ×.
pti = pedicle of the tentillum, *cpti* = crest of the tentillum containing nematocysts and black granulations, *mpti* = middle part of the tentillum (not indicated in fig. 89 but situated between *cpti* and *apti*), *apti* = apex of the tentillum.

Fig. 90. A young bract of the same. 4 ×.

Fig. 91. *Crystallomia* spec. group I. (Cat. 163 D). 25 ×.
n = young nectophore, *bn* = buds of nectophores, *prs* = primary siphon.

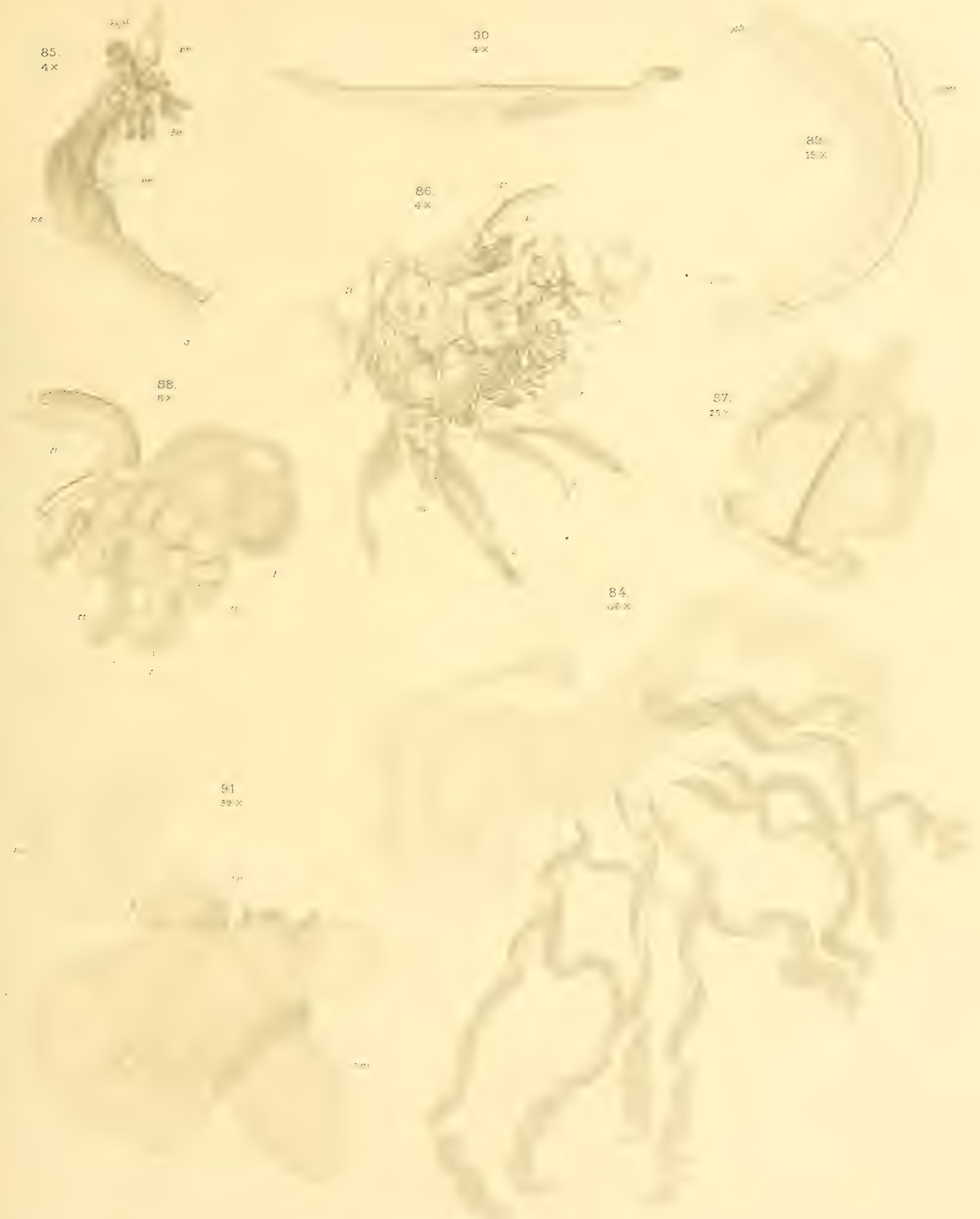

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PLATE XII.

Crystallomia Dana.

Fig. 92. *Crystallomia* spec. group I. (Cat. 25 A.). 15 ×
Fig. 93. *Crystallomia* spec. group I. (Cat. 151 F.). 14 ×.
Fig. 94. *Crystallomia* spec. group I. (Cat. 88 M.). 13 ×.
rprs = reduced primary siphon.
Fig. 95. *Crystallomia* spec. group I. (Cat. 163 A.). 25 ×.
Fig. 96. *Crystallomia* spec. group I. (Cat. 71 B.). 28 ×.

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PLATE XIII.

Fig. 97. *Larva of Agalma* spec. (Cat. 157). 25 ×.

Fig. 98—102. Tentilla belonging to the genus *Crystallomia* Dana.

Fig. 98. *Tentillum type I.* (Cat. 25 A. see fig. 92, Pl. XII). 50 ×.
Fig. 99. *Tentillum type II.* (Cat. 151 A see fig. 109, Pl. XIV). 220 ×.
Fig. 100. *Tentillum type II.* (Cat. 151 A see fig. 109, Pl. XIV). 61 × with lateral filaments and first turn of the cnidoband protruding out of the involucrum.
Fig. 101. *Tentillum type III.* (Cat. 154 see fig. 105, Pl. XIV). 28 ×.
Fig. 102. *Tentillum type IV.* (Cat. 154 see fig. 105, Pl. XIV). 50 ×.
Fig. 103. *Crystallomia* spec. group IV. (Cat. 53). 8 ×.
Fig. 104. Peripheral glands found on the bracts of Cat. 53. 65 ×.

PLATE XIV.

Crystallomia Dana.

Fig. 105. *Crystallomia* spec. group I. (Cat. 154). 14 ×. Pneumatophore invisible, situated on the left side of the drawing underneath the other appendages.
Fig. 106. *Crystallomia* spec. group II. (Cat. 175 G.). 27 ×.
Fig. 107. *Crystallomia* spec. group II. (Cat. 88 J.). 5 ×. Nectophores much altered through preservation.
Fig. 108. *Crystallomia* spec. group II. (Cat. 176 F.). 16 ×.
Fig. 109. *Crystallomia* spec. group II. (Cat. 151 A.). 10 ×.

PLATE XV.

Fig. 110. *Crystallomia* spec. group II. (Cat. 215 F.). 12 ×.
Fig. 111. *Crystallomia* spec. group II. (Cat. 88 D.). 6 ×.
Fig. 112. Detached cormidia of *Crystallomia* spec. group II. (Cat. 215 B.). 10 ×.
Fig. 113. Mutilated specimen of *Stephanomia* spec. Per. et Les. (Cat. 115 A.). 3,5 ×.
n = much altered unique nectophore.
Fig. 114. The detached bract *a* (Fig. 113) of the same. 2,8 ×.
Fig. 115. *Halistemma* spec. Huxl. (Cat. 153). 8 ×.

PLATE XVI.

Fig. 116. *Halistemma cupulifera* nov. spec. (Cat. 160). 11 ×. Complete.
Fig. 117. A tentillum of the same. 27 ×.
Fig. 118. The basal part of the terminal filament of a tentillum (fig. 117). 130 ×.
Fig. 119. A full-grown bract of the same. 17 ×.
Fig. 120. *Physophora hydrostatica* Forsk. (Cat. 230). 18 ×. Complete.
Fig. 121. *Physophora hydrostatica* Forsk. (Cat. 173 B.). 8 ×. Complete.
Fig. 122. A tentillum of *Physophora hydrostatica* Forsk. (Cat. 230). 22,5 ×.
Fig. 123*a*. *Anthophysa formosa* Fewk. (Cat. 23 B.). 10 ×. Complete.
Fig. 123*b*. The only remaining bract of the same enlarged. 15 ×.

PLATE XVII.

Archangelopsis typica nov. gen. nov. spec.

Abbreviations.

po = pneumatocodon (Luftschirm).
exo = ectodermlayer of the pneumatocodon.
fo = chitinouslayer of the pneumatocodon.
eno = entodermlayer of the pneumatocodon.
p.sacc = pneumatosaccus (Luftsack).
exac = ectodermlayer of the pneumatosaccus.
fac = chitinouslayer of the pneumatosaccus.
enac = entodermlayer of the pneumatosaccus.
p.cav = pericystic cavity.
py = pneumatocyst (Luftflache).
c.py = club-shaped enlargement of the pneumatocyst.
f.py = folds of the same in the secondary ectoderm, situated in the pneumatosaccus.
p.oy = pneumatopyle (Trichterpforte).
pe = pneumatochone (air-funnel, infundibulum, Lufttrichter).
sec. exy = secondary ectoderm in the pneumatochone (pneumadenia) and in the cavity of the pneumatosaccus.
r.z = gigantic cells in the secondary ectoderm.
cav. sec = cavities which are formed by the gas-secreting secondary ectoderm.
b.a = buds of youngest appendages.
s. a. α = transverse entodermal septa, connecting the pneumatochone and the pneumatocodon.
s. s. β = transverse entodermal septa connecting the pneumatosaccus and the pneumatocodon.
a.s = appendages of the siphosome.
a.s.a = buds of nectophores (?).

Fig. 124. A reconstruction of a median longitudinal section through a typical Angelid (after sections through three specimens of *Archangelopsis typica* nov. gen. nov. spec. enlarged about 25 ×. (Ectoderm = yellow, chitinous layer = black, entoderm = grey, secondary ectoderm = green) Semi-diagrammatical.

Fig. 125 I. A longitudinal section of the same showing part of the pneumatosaccus; first appearance of the air-funnel after section through the youngest appendages (glass 1—10 III 7). Abbreviations as indicated above (Cat 10 A. α glass 10 III 8). ± 25 ×.

Fig. 126 II. The same, the buds of appendages on this figure and the next (126—133) are left out. (Cat. 10 A. α glass 11 II 4) ± 25 ×. First appearance of the club-shaped enlargements of the pneumatocyst as an odd spherical body of chitinous substance in the air-funnel.

Fig. 127 III. The same (Cat 10 A. α glass 11 III 3). The air-funnel approaching the pneumatosaccus, both their chitinous layers uniting, paired club-shaped enlargements increasing in size. ± 25 ×.

Fig. 128 IV. The same (Cat. 10 A. α glass 11 III 7). The chitinous layer of the pneumatosaccus shows an interruption, the club-shaped enlargements are connected by a thread, which faces the pneumatocyst. ± 25 ×.

Fig. 129 V. The same (Cat. 10 A. α glass 12 I 4). The thread of the club-shaped enlargements unites on both sides with the chitin of the pneumatocyst. The pneumatocyst with its chitinous ring is now clearly recognizable. This time we may speak of pneumatopyle (Trichterpforte). ± 25 ×.

Fig. 130 VI. The same (Cat. 10 A. α glass 12 II 5). Formation of cavities in the secondary ectoderm, both in pneumatochone and near pneumatosaccus. ± 25 ×.

Fig. 131 VII. The same (Cat. 10 A. α glass 13 I 4) ± 25 ×. The same cavities increase in size. Compare this sketch with Fig. 136 of Pl. XVIII.

Fig. 132 VIII. The same (Cat. 10 A. α glass 13 I 7). The cavities become spherical again and are separated one from the other by secondary ectoderm. ± 25 ×.

Fig. 133 IX. The same (Cat. 10 A. α glass 13 III 5). The same cavities close again. ± 25 ×. (N.B. By mistake IX has been omitted on the plate).

Fig. 134. One of the youngest buds of appendages, greatly magnified (Cat. 10 A. α glass 12 II 7). 220 ×.

Fig. 135. Secondary ectoderm cells with part of a branched giant-cell (black granulation). (Cat. 10 A. α glass 13 II 6). 220 ×.

Sib. VII

...no

...exo

...fo

.fac

..enae

p impr.

P. W. M. Trap impr.

PLATE XVIII.

Fig. 136. *Angelopsis globosa* Fewkes (after FEWKES 89 Pl. VII, fig. 2). Transverse section through the float and the siphosome.
gm = spherical bag-like structure, *o* = opening of the same into the cavity of the float, *f* = "muscular floor".

Fig. 137. *Archangelopsis typica* nov. gen. nov. spec. (Cat. 10 A.). Complete, after a photograph. 4,5 ×. The arrow indicates the direction of the sections.
pn = pneumatophore, *z.pr* = zone of proliferation, *n* = nectophores, *s* = siphon, *t, t* = tentacles.

Fig. 138. *Archangelopsis typica* nov. gen. nov. spec. (Cat. 22). 4,5 ×. Complete, after a photograph. Abbreviations as in Fig. 137.

Fig. 139. *Archangelopsis typica* nov. gen. nov. spec. (Cat. 10 B.). Longitudinal median section. Abbreviations as in Pl. XVII.

Fig. 140. Parts of gigantic cells of the same. (Cat. 10 A. α glass 14 III 4). 225 ×.

Fig. 141. *Rhizophysa filiformis* Forsk. A young specimen, complete. (Cat. 166 A.). 9 ×.

Fig. 142. One of its young tentilla, the future trifid type, enlarged. 220 .

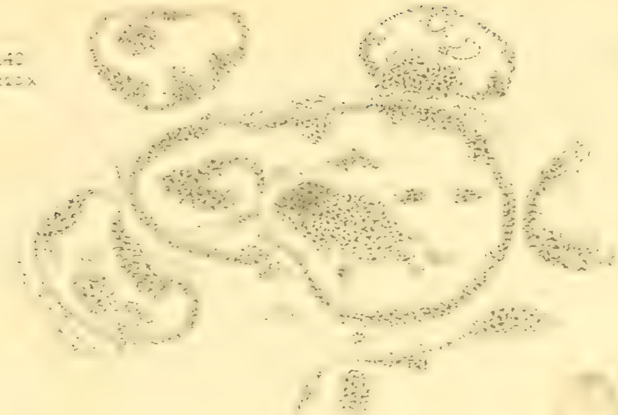
Fig. 143. *Rhizophysa filiformis* Forsk. (Cat. 18). A trifid tentillum showing its two lateral filaments. 110 ×.

Fig. 144. A lateral view of the same. 110 ×.

Fig. 145. A beak-like tentillum of the same, altered through the preservative fluid. 110 ×.

137
1½ ×

140
220 ×



142
220 ×

136

141.
9 ×

139
10 ×

145
21 ×

138.
1½ ×

143
110 ×

144
110 ×

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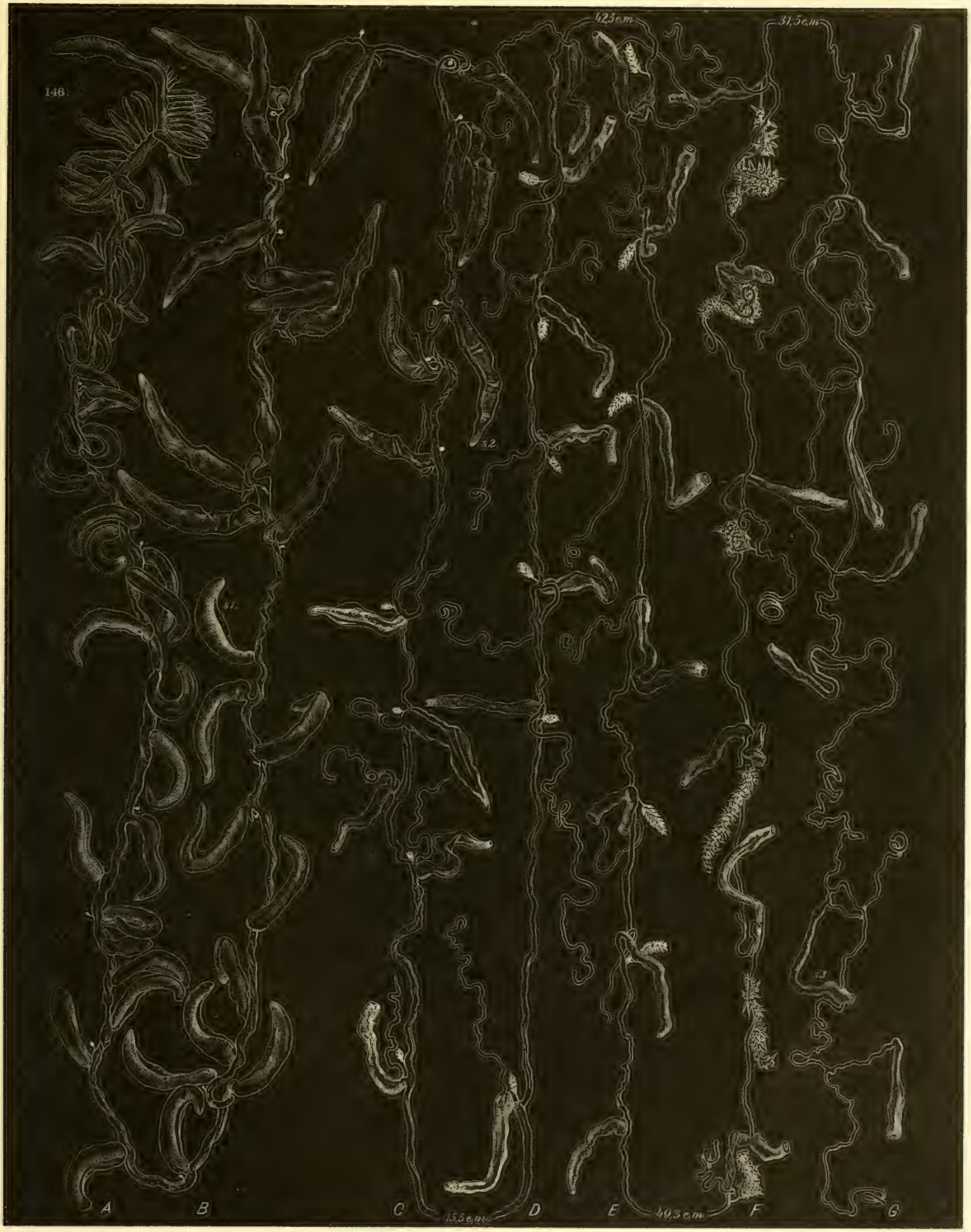
PLATE XIX.

Fig. 146. *Pterophysa grandis* Fewk. Natural size. (Cat. 8). See text p. 108.



K. C. Hanau del.

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PLATE XX.

Fig. 147. *Rhizophysa Eysenhardti* Ggbr. (Cat. 20 A.). Natural size.

Fig. 148. *Bathyphysa Sibogae* nov. spec. (Cat. 27). Natural size.

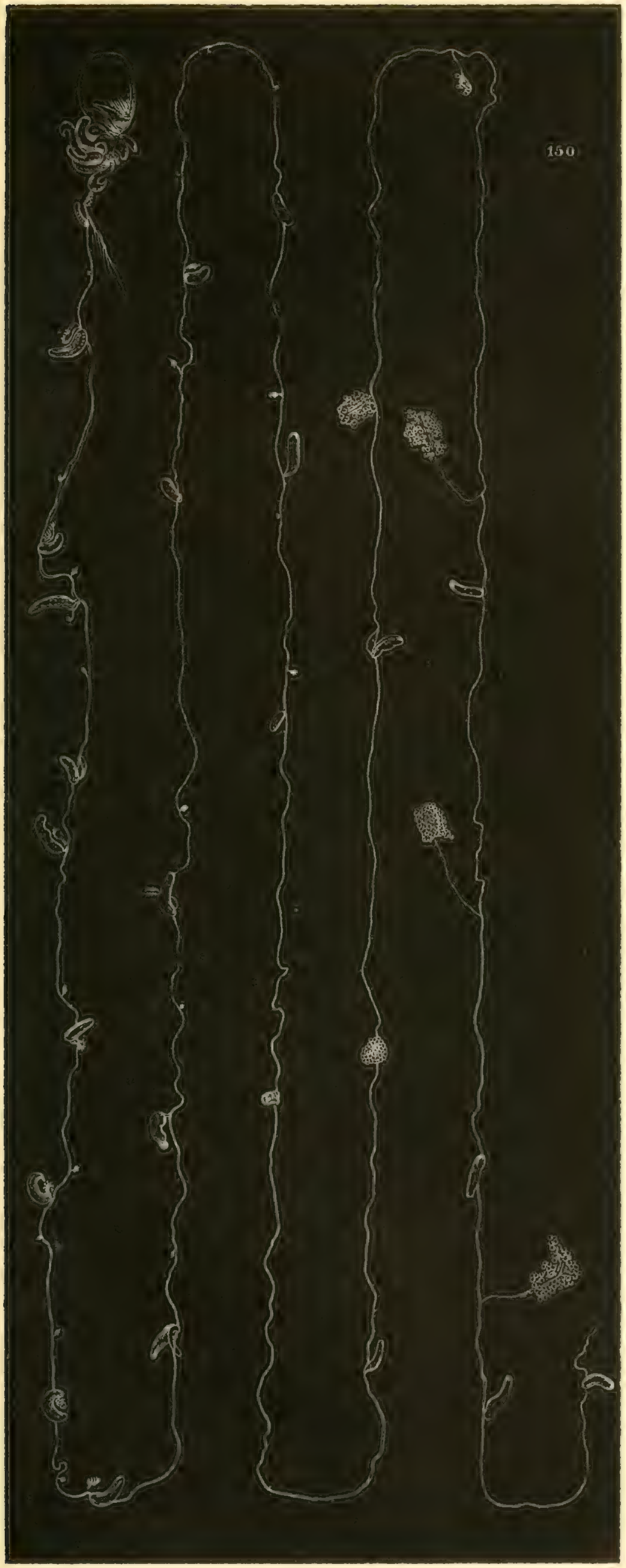
Fig. 149. *Pterophysa (Bathyphysa) Studeri* nov. spec. (Cat. 6). A lateral view of its pneumatophore. The pneumatocodon entirely split open (as far as the porus). Apically part of its wall has been cut away, to show the bunch of hypocystic villi.

K. C. Hanau del. P. W. M. Trap impr.

PLATE XXI.

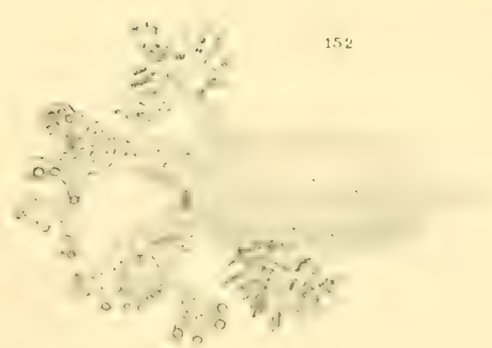
Fig. 150. *Rhizophysa Eysenhardti* Ggbr. (Cat. 14 A.). Natural size.
Fig. 151. *Rhizophysa filiformis* Forsk. (Cat. 18). Natural size.
Fig. 152. A palmate tentillum of the same, much altered through the preservative fluid. 110 ·.

150



151

152



K. C. Hanau del.

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PLATE XXII.

Fig. 153. *Pterophysa (Bathyphysa) Studeri* nov. spec. (Cat. 6). The hypocystic villi in the pneumatophore are not sketched; the pneumatophore therefore is shown in its more natural shape. Natural size. *s, s, s* = three siphons.

Fig. 154. The second siphon of the same enlarged, to show the short pedicle at its base. 2 ×.

Fig. 155. A hypocystic villus of the same. A median longitudinal section (Cat. 6 glass 3 IV 4), showing an outward layer of entodermal cells and a gigantic nucleus interiorly. 120 ×.

Fig. 156. *Rhizophysa Eysenhardti* Ggbr. (Cat. 16). Entodermal cells of the apical outer part of a hypocystic villus. 200 ×.

Fig. 157. *Pterophysa (Bathyphysa) Studeri* nov. spec. (Cat. 6). A transverse section through the gigantic nucleus of the cell indicated on Plate XXII, fig. 155 (glass 7 II 1). The surrounding entoderm layer only partly indicated. 930 ×.

Fig. 158. A transverse section of the same somewhat further, also indicated on Pl. XXII, fig. 155 (glass 7 II 3). 930 .

Fig. 159. A hypocystic villus of the same enlarged. 25 ×. Showing the size of the cell in which the gigantic nucleus is contained, and another transverse wall of a cell in which no nucleus is to be found.

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PLATE XXIII.

Fig. 160. *Bathyphysa Sibogae* nov. spec. (Cat. 5). Natural size. 1—32, indications of detached (except 21, 23) siphons on the stem.

Fig. 161. Pneumatophore and youngest appendages of the stem of the same. 1,5 ×.

Fig. 162. One of the youngest siphons of the same (*z* in fig. 161) enlarged. 13 ×.

Fig. 163. Tentacle and tentilla of the same (Tentacle of the 21st siphon). 15 ×.

Fig. 164. The largest tentillum of Fig. 163 enlarged. 56 ×.

Fig. 165. Transverse median section through a siphon of *Pterophysa (Bathyphysa) Studeri* nov. spec. (Cat. 6). 14 ×.

PLATE XXIV.

Fig. 166. *Bathyphysa abyssorum* Studer. Pneumatophore of STUDER's original material, sketch made in Berlin. Natural size.
p.o = pneumatocodon, *p.sacc.* = pneumatosaccus, *p.e* = remains of pneumatochone.

Fig. 167. *Pterophysa grandis* Fewk. (Cat. 6). A young siphon (on Plate XIX indicated as *s.* 1). 2 ×. The lateral ptera well-developed.

Fig. 168. Another siphon of the same (on Pl. XIX indicated as *s.* 2). 2 ×. The lateral ptera as small longitudinal lines. At its base a tentacle and a young gonodendron.

Fig. 169. A third mature siphon of the same (on Pl. XIX indicated as *s.* 3). 2 ×. No lateral ptera. Long tentacle at the base of the siphon.

Fig. 170. Median longitudinal section through a siphon (Cat. 8 glass *b* 1 II 2) of the same. 260 ×.

Fig. 171. Part of the stem of *Pterophysa (Bathyphysa) Studeri*, which does not belong to the specimen of Pl. XXIII, fig. 160, but was found in the same bottle. 0,5 ×.

Fig. 172. *Rhizophysa Eysenhardti* Ggbr. (Cat. 20 A.), a tentacle (*t*) with tentilla (*ti, ti*). 11 ×.

Fig. 173. *Bathyphysa Sibogae* nov. spec. (Cat. 27) see Pl. XX, fig. 148. Base of a siphon (*t.*) with tentacle and young tentilla (*ti*). 13,5 .

Fig. 174. *Physalia utriculus* Lamartinière. (Cat. 4). Part of a gonodendron showing a gelatinous polypoid, 2 palpons, a medusiform gonocalyx and 11 gonophores. 15 .

Fig. 175. The main-branch of a gonodendron of the same with the principal side-branches (A—F) a gelatinous polypoid, gonophores and a siphon (?). 7 .

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CONDITIONS GÉNÉRALES DE VENTE.

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